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NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

CONTENTS.

EDITORIALS:

The Museum Committee 373
Engineers' Instruments at the Centennial 373
Miners' Safety Squibs 373
Report of the Boston Gas Commissioners 373
Can the Commercial Nomenclature of Iron be reconciled to Scientific Definitions of the Terms used to Distinguish the Various Classes? 375
American Engines in Europe 375
The Mineral Wealth of Japan 3 7
Grindstones at the Centennial 379
The Nova Scotia Coal Trade 379
The Divining Rod 379
Rock Drills at the Philadelphia Exhibition 382
Preparation of Platinum Black with Glycerine 380
Annual Report of the Director of the Mint 381
Furnace Notes 381
Underground Temperature 381
STATISTICS OF COAL PRODUCTION 382
COAL TRADE REVIEW 382
IRON MARKET REVIEW 384
METALS 384
The Salt Lake City Ore and Bullion Shipments 384
FINANCIAL:
New York Stocks 385
Philadelphia Stocks 385
Copper Stocks 385
Gold and Silver Stocks 385
Gas Stocks 387
Advertisements 388

THE MUSEUM COMMITTEE.

WE learn from Philadelphia that the Centennial Headquarters of the Institute have been broken up. If we had space for sentimental reflections, this dissipation of a scene so full of pleasant associations would give us ample material. But we must not venture upon that theme. The headquarters of the Museum Committee have been removed to No. 206 South Fourth Street, Philadelphia, from which point their operations are actively conducted. Among the latest acquisitions of the Institute are the Uddeholm and Bofors Swedish exhibits, the entire collective exhibit of the Swedish *Jernkontoret*, and the very extensive Russian display of Prince DENISDOFF, illustrating his copper and iron works. It is difficult to realize the astonishing value of the collections so suddenly and cordially presented to the Institute. We trust that members and associates will rise to the occasion, and see to it that the Committee is not crippled by lack of funds in the subordinate though indispensable work of receiving and housing so many treasures. Five thousand dollars is wanted; less than two thousand has been subscribed; but this sum has been given by a small portion of the members with a ready enthusiasm which indicates that the rest will easily follow, upon a simple publication of the facts.

ENGINEERS' INSTRUMENTS AT THE CENTENNIAL.

THE high reputation which HELLER & BRIGHTLY'S engineers' instruments have acquired, not in this country alone, but throughout the world, makes the award of the distinguished Judges of this department to the firm in question for their numerous improvements, a mere matter of course. Certainly no one who examined the exhibit or who has used the instruments will doubt the justice of this acknowledgment of well-earned prominence. The foreign Judges, who were all experts of the highest standing in the use and construction of scientific instruments, were very emphatic in their praise of these instruments, and asked for detail drawings in order to incorporate them in their reports to their governments. There can be no question that in surveying instruments and in methods of making surveys we in America are far in advance of the older European countries, and the exportation of transits, levels, and other instruments of this class to all parts of the world is becoming an interesting feature in our growing foreign trade. It is a very rare thing that an engineer who has once used an American instrument will afterwards willingly work with another; and such has been the general remark among engineers who have come from all parts of the world to the Centennial this summer. The foreign instruments have, nevertheless, some very good points, and we propose to give, in a series of articles, the construction of both the foreign and American instruments that have been shown at the Centennial.

MINERS' SAFETY SQUIBS.

ONE of the most ingenious devices in blasting is the use of the "squib." This, as it was usually made, was a straw or quill of three or four inches in length filled with fine powder, and to one end of it is attached a slow match, which gives the miner time to retire before the explosion of the blast takes place. These squibs act as rockets and shoot back to the charge through the hole left in the tamping by the needle around which the tamping is rammed, or if the "blasting barrel"—which is a piece of small (¾ in.) gas-pipe 4 or 5 feet long—is used, then the squib is inserted in one end and it shoots through to the other, which is inserted in the cartridge, and thus ignites the charge.

Squibs were generally prepared by the miners themselves, usually at their homes, but were often filled in the mines, the slow match being a piece of cotton wicking or twisted paper, dipped in oil. These squibs and their matches were imperfect. Sometimes missing fire, and sometimes firing prematurely, they were thus the cause of numerous accidents, and were moreover much more expensive than a better article would have cost when made by machinery and on a large scale.

In 1870, the late Mr. S. H. DADDOW—a mining engineer of great practical experience—devised a simple, ingenious squib and match which are now generally used throughout the coal regions and are much safer, more reliable and economical than the old straw squib, or than fuse. The squib and its match (some idea of which may be gained from an inspection of the cut in the Company's advertisement on the front page) is about 6½ inches long, but different sizes and kinds are made, such as the "artificial straw" and match for coal beds of small dip and horizontal holes generally; "rocket squibs" for pitching holes; "gas squibs" and "double gas squibs" for use in gaseous mines; "primer squibs," and patent incombustible "safety fuse," which will not smoulder, for rock blasting in iron and other mines, where the needle is not used.

One of the chief causes of accidents in mines producing large quantities of fire-damp was the firing or slow match, which would at times burn with a flame and ignite the gas, and thus the squib and charge, before the men had time to retire. A patent squib is made specially for use in such mines: it burns without flame, but with a strong ember which will not ignite the gas. In some of the anthracite mines of Pennsylvania the quantity of gas (carburetted hydrogen) given off by the coal is so great that it actually blows the powder and squib out through the blasting barrel. For this case a patent double gas squib is manufactured, and so for each kind of work a special squib is made. There are three kinds of matches manufactured: the composition or sulphur match (which is that most generally used), the bright flame or paraffine match, and the fusing or gas match. The Miners' Supply Company (which holds the patents on these various squibs and matches) was organized and commenced the manufacture at St. Clair, Pa., in 1870. The works have now a capacity of 250,000 squibs a day, and even in the present depressed state of mining gives employment to about fifty persons. Many of these are girls, who make the "artificial straws" or shells for the reception of the powder. The shells are coated with a varnish which gives them a smooth, glossy appearance and renders them fire and water proof. Each of these squibs passes through eight different operations before it is ready for the miner, and when complete they are packed in boxes containing 103 squibs each, and are retailed at 50 cents a box. The heirs of the patentee are now introducing these useful little articles into the English mines, and there is no doubt they will soon be accepted there, as they have been here, for their economy, safety and convenience.

REPORT OF THE BOSTON GAS COMMISSIONERS.

THE Board of Aldermen of the City of Boston, on January 18, 1875, "ordered that His Honor the Mayor be requested to appoint three Commissioners to investigate and report, (1.) Upon the quality and price of the gas furnished in this city as compared with other large cities in this country and Europe; (2.) Whether any improvements can be made in the present methods of manufacturing gas by the different companies in this city; (3.) Whether it would be expedient for the city to undertake the manufacture and supply of gas for public and private lighting; and, (4.) Whether any further legislation is desirable to enable gas consumers, or the municipal authorities, to secure a prompt and impartial investigation of complaints against private companies, and an efficient remedy for any abuses of which they may be found guilty."

Under this authority the Mayor appointed Messrs. CHAS. F. CHOATE, JOHN FELT OSGOOD, and Dr. EDWARD S. WOOD, and these gentlemen have recently made their report in a pamphlet of 100 pages. It will be seen that the field assigned them for investigation was broad and difficult, and their report carries evidence of a careful consideration of the various departments of the subject, and presents many excellent suggestions both as to the rights of the producer and the consumer.

They have perhaps accomplished all that could be expected of an inexpert board not familiar with the bottom facts, about which the companies are so careful to hang a thick, mysterious veil, as the Commissioners themselves acknowledge. If this has been for a moment withdrawn, it has been on the express condition that the gentlemen should not tell what they saw behind it, and so the items pertaining to the actual cost of making gas, though most vital to the discussion, are left out! For this we do not criticise the Commissioners, who must respect "confidential" communications, of course; but this secrecy on the part of the companies is ominous, and constitutes a standing argument for suspicion against their management.

The report, after stating some general considerations, goes into a description of the "different processes for the manufacture of illuminating gas" in successful operation, which are divided into three classes, viz.:

1. Coal gas. 2. Petroleum, or Naphtha gas. 3. Water gas.

The treatment of this part of the subject appears somewhat narrow, being in respect to the old method (coal) purely descriptive, while regarding the new systems (oil and water gases), it rises to criticism. Thus the weak points in the coal process escape the attention they deserve, which is unfortunate, as to them in a large degree is chargeable the high price of the product.

The mechanical defects in the antiquated retort, involving both labor and wear and tear, and the chemical imperfection of a process yielding such an excessive proportion of residuals, not always salable, should have been pointed out. These will be laid before our readers at another time in a separate article.

The report, however, takes strong ground in favor of the use of petroleum or naphtha gas, *for enriching*, on the score of economy. The Commissioners say:

"Its value can be best ascertained by comparing it with one of the other substances used for enriching gas, and it cannot be compared to any greater disadvantage to itself than with the mineral albertite. The yield from the albertite (by tests in the Boston Company's experimental works) was 14,694·4 cubic feet of about 55-candle gas per ton, which costs say $25. Naphtha, at 100. per gallon, will yield for $25, 19 872·5 cubic feet of 64·5-candle gas, or 5,178 cubic feet more gas, of a richer quality, than a ton of albertite."

A pure petroleum gas is not recommended because—

"In the first place every burner in the city used for consuming gas must be changed, since burners adapted to a 16 or 20 candle gas are totally unfit for burning a 60 or 70 candle gas. Those now in use are graduated to burn four or five feet per hour of gas, which has a specific gravity of about 0·450. If a rich naphtha gas were burned with such burners, although less than the ordinary amount would be consumed per hour, it would give a very smoky flame. In those places where unmixed petroleum gas is used, the works are new and the fixtures contain burners suited to the gas, which permit only one or two cubic feet to pass through them per hour. Then, too, the flame produced by petroleum gas, burning in an appropriate burner, is a very small flame and one which, in our opinion, would not prove satisfactory to consumers who had been accustomed to the larger coal-gas flames, the fact that the smaller flame gives an amount of light equivalent to the largest coal-gas flame not being appreciated."

This is undoubtedly true, especially since its greater illuminating value has to be paid for at the rate of $10 per thousand by the consumer.

Since, then, the necessity for the employment of a diluent or non-illuminating gas is admitted, and since the proportion of this is 90 per cent. of the whole volume of the gas ordinarily distributed, it would seem of great importance to determine from what source or by what process this large proportion of the total product can be obtained with the best results as to quality and economy. The cost of the whole must be quite largely determined by the cost of the nine-tenths. On this point the testimony of the Commissioners appears to confirm the statements made by this Journal during the past few months in favor of water-gas. The small quantity of coal (either anthracite or bituminous) needed to evolve a very large volume of gas is surprising, and the little labor required in the operation is, if possible, still more so. They say, regarding the Lowe process at Manayunk station, Philadelphia: "Two men in each watch can manage six" (should be *three*) "sets of apparatus and the boiler, and one man per day is all of the labor required in the purifying-house. Thus, five men is all of the labor required to make 450;000 cubic feet" (reported 750,000, owing to above error in number of generators), "the capacity of each set being about 125,000 cubic feet; but on a basis of 200,000 cubic feet, the labor would cost about $10, or 5 cents per 1,000 cubic feet."

The latest advices from Philadelphia appear to fully confirm these estimates, an increased volume being now delivered of high and uniform quality, under ·600 density, and at a cost which we believe to be less than 55 cents per 1,000 feet, including interest on capital.

The process in operation at Poughkeepsie (carburetted water-gas) is quoted also, and it is remarked—"It is estimated by this process 1,000 cubic feet of gas can be made from 17 lb. anthracite coal, and 4 gals. of petroleum or naphtha, which gives a cost of 37·3 cents, with coal at $7 per ton, and petroleum at 12½ cents per gal., *exclusive* of fuel, labor, etc."

It is unfortunate that the Commissioners were not a little more full and accurate in their figures, for it seems to us that 17-2240 of $7 = 5·31 cents, and 4×12 = 50 cents, or 55·31 cents instead of 37·3 cents per 1,000 feet; and since the Commission was appointed in part to ascertain the value of "improvements" in gas-making, it is a strange omission to make with regard to the cost of such important items as "fuel, labor, etc," in this process.

But aside from the economic features of the water system, the gas obtained by it possesses some excellent qualities. Chemical analysis shows it to be remarkably free from the ordinary impurities, and an extended experience in its distribution seems to have established the fact that it is not only more permanent, but that it maintains its illuminating power very much better under low temperatures than gas made from coal in the ordinary way.

It is scarcely necessary to add that this is a most important matter not only to the consumer, but to the companies, who find it very difficult (from their want of success one would suppose it impossible) to distribute in the coldest winter weather a gas up to the standard required by law. These very important subjects of the condensation of the gas and its loss of illuminating power at low temperatures seem to have altogether escaped the attention of the Commissioners, though they are exceedingly important to consumers.

The report notes the fact that the best gas is the cheapest to the consumer, 1st, because less is required to yield a given amount of light; 2d, because a higher illuminating power involves a greater density in the gas, and this then flows more slowly through the meters, and the bills are correspondingly decreased.

Did it not dawn upon the single-minded Commissioners that in this very fact lies one of the principal temptations of the companies, who do not seem as yet to recognize the wisdom of intermixing a little conscience with their gas, but use both in a very attenuated form, and are thus enabled to take more money for a poorer article than they would get for the better they contract to furnish? Some of the companies have tried mixing common air with the gas in the hope of getting a cheap diluent, but it was discovered that besides weighting down the gas, it was destructive of illuminating power, and, what is generally considered of more consequence, it did not pay. The Commission speak highly of the gas sold by the Mutual Gas-Light Company of this city, whose works are indeed among the finest in the country, and under excellent management. This light is brilliant, like all flames into which petroleum products enter, and is of somewhat higher candle-power (say 18 to 19) than that distributed by the other New York companies. The charge often brought against it of *smokiness* was examined into by the Boston gentlemen, who assert that all such complaints are traceable to cases in which it has been used without a reduction in the size of the burners.

If this be the explanation, it is still, we think, evidence of imperfect manufacture or composition, for recent experiments have shown that a gas of over 20 candle-power can be burned in a 10-feet burner without smoke. As already stated, the Commissioners are favorably impressed with the naphtha process, which is employed by the Mutual Company for enrichment in the place of cannel coals; and appear so enthusiastic over it that we suspect they were not made acquainted with the large residual waste flowing from the condensers of the naphtha gas. Some months ago this was admitted by those in charge to amount to 600 bbl. a month, and to be an item of absolute loss. As an expert analysis showed this "waste product" to contain the illuminating properties sufficient for 9,000,000 cubic feet per month, the process in operation at those works did not strike us as excessively economical; and if it really respresents a saving over the ordinary coal system, as the Commissioners seem to think, then it must be evident to every one that there is great room and need for improvement in our present methods of gas-making.

One would suppose that the very first step in the labors of a commission appointed "to investigate whether any improvements can be made in the present methods of manufacturing gas" would be to ascertain the actual cost of making gas by the different methods in use. How else would it be possible to express an intelligent opinion on the subject? Of course the companies do not wish it to be known what it costs them to make gas, but the information can, nevertheless, be quite easily obtained: in this case the companies, by the shrewd little device of giving the Commissioners the figures "confidentially," closed their lips. There was, of course, no necessity for the Commission to accept the information on these terms, since they could easily have obtained it otherwise, but since in their report it was necessary to make some comparison they adopted the following extraordinary method of ascertaining the cost of making gas. We commend the marvellous ingenuity of the plan. It should at least be perfectly satisfactory to the Mutual and the Boston Gas-Light Companies—whatever it may be to any one wishing actual information on the subject. The report says:

Since it is a very difficult matter to make up the cost and delivery of gas in detail of costs of material, labor, etc., while comparing one company with another, inasmuch as information given us touching upon net cost of manufacture was confidential, and as each company has a different method of figuring, we will, for the sake of comparison, presume that neither company has any annual surplus after paying the dividends, and so get at the supposed cost of gas to the company by deducting the amount of dividends and taxes *pro rata* per 1,000 cubic feet from the average price of gas to the consumer. Thus, for the New York Mutual Company:

20 per cent. dividends paid on capital $2.500,000 (paid in)	$500,000	
6 per cent. interest on bonds, $500,000	30,000	
Taxes in New York, say	50,000	–$580,000
With delivery of 509,000,000 cubic feet gives for each 1,000 feet sold	$1 14	
Average price for gas, $2.75 per 1,000 cubic feet, less 10 cents per 1,000 cubic feet for discount, street lamps	2 65	
And we have the supposed cost per 1,000 cubic feet	$1 51	

By a similar arrangement of figures the cost of the Boston Company's gas is "supposed to be" 34c. higher, or per 1,000 cubic feet $1.85.

With these results of this wonderful method of estimating the cost of making gas, the Commissioners rest satisfied, while they must have known—for they say the information was given to them as "confidential"—that the actual cost of the gas in each of these cases was about *one-half* the figures they give. It is generally understood—and the understanding is based on high authority—that the cost of making gas by the Mutual Company is not far from 80 cents per 1,000 feet, and the cost in Boston should not be, and probably is not, more than 10 cents per 1,000 additional. But to show the utter absurdity of this method of "estimating" the cost, let us apply it to the Manhattan Company of this city, bearing in mind that the apparent object of the Commissioners was to show the greater economy of the Mutual method of making gas (an economy which may still exist for aught that can be learned from this plan of "estimating" prices):

Dividends of 40 per cent. actually paid in 1875 on a capital of $4,000,000	$1,600,000	
Taxes estimated at	100,000	—1,700,000
With delivery of 1,000,000,000 cubic feet, gives for each 1,000 cubic feet, say	$1 70	
Present price of gas	2 50	
"*Supposed*" cost of Manhattan gas	80	

This "estimate" is not so wide of the mark, the actual figures being probably something less than this. The cost of distributing, being independent of the process of manufacture adopted, could not have come into the calculation. It will be noted that every reduction in the selling price of gas produces an equal reduction in the *cost*, according to this method of estimating. We always thought that when the companies received less for their gas, they produced it more economically, but we scarcely thought they had gauged the economy so nicely.

The report takes strong ground against competition in these words:

In regard to the admission of another gas company into Boston, to compete with the Boston Gas Light Company, we are firmly of the opinion that no such competi-

tion should be permitted, unless the competing company be owned and managed by the City of Boston itself; and this opinion has been formed from a study of numerous cases of unsuccessful competition in supplying gas to cities in both the United States and Europe. By unsuccessful, we mean that the competition has not succeeded in permanently lowering the price of gas to the citizens. It has invariably resulted in a compromise as to price or district.

In other words, the Commissioners have found that when any serious competition is threatened, the existing companies simply buy up the opposition, and the dear public is left to think that because there are two or more companies, there is corruption. The enormous profits of gas companies enable them to "squelch" any opposition, and probably the report was correct in saying that nothing but the city itself could make an effective competition.

The Commissioners sum up by admitting the difficulties encountered by any board of examiners void of power, and recommends the appointment of a permanent board of State Commissioners which shall have authority to thoroughly inspect all of the companies of the State, and also, through a competent auditor, examine the accounts of the companies (which accounts shall be published annually); also that the Commissioners shall have the power to fix the price of gas at such rates as would not allow the earning of a dividend in excess of 10 per cent. on the actual capital paid in, and any excess of profit above this to go toward the diminution of the price of gas the following year. This plan is somewhat like that governing the London gas companies.

CAN THE COMMERCIAL NOMENCLATURE OF IRON BE RECONCILED TO SCIENTIFIC DEFINITIONS OF THE TERMS USED TO DISTINGUISH THE VARIOUS CLASSES?*

By William Metcalf, Pittsburgh, Pa.

IT is the object of this paper to oppose unnecessary changes, and the introduction of new and confusing terms.

From the earliest times of which we have any records on the subject, iron has been divided into general classes. Whether iron was first known in the form of wrought iron or of steel, is a matter of no importance; but at the time when cast iron first became a prominent article of commerce, wrought iron and steel were old products—steel, at that time, being generally made from wrought iron by the process of cementation.

As steel was then properly defined as iron containing more carbon than wrought iron, so cast iron was appropriately defined as iron containing more carbon than steel.

Until the year 1776, when HUNTSMAN first began the manufacture of a new kind of iron by melting wrought iron and steel in crucibles, the above definitions were all that could be desired. At first, probably, owing to imperfect appliances, only a highly carbonized iron was melted in crucibles, and this led to its being called *cast steel*.

If our ancestors had found a name for this material not involving the use of the word steel, we would have been saved the trouble of the present discussion.

As the arts developed, new uses were found for steel, and the products of the crucible were varied, until at the present day it is quite common to find steel containing no more carbon than average wrought iron, and other steel containing nearly or quite as much carbon as some cast iron. All of these various products of the crucible have retained, or received, the name *cast steel*, usually abbreviated to the simple word steel, without causing any confusion among producers or consumers in regard to terms or their meaning.

In A. D. 1855, twenty-one years ago, the Bessemer process was introduced; this was followed in a few years by the Siemens-Martin process, and the products of both were at once, and have ever since, been called steel, from the fact that they were identical in chemical and physical properties with crucible cast steel.

At the present time, then, we have three subdivisions of cast steel, viz.: Crucible cast steel, Bessemer cast steel, and Siemens-Martin, or open-hearth, cast steel. The enormous increase of the steel industry resulting from these three processes has brought steel fully up in importance to the rank of wrought iron and cast iron.

The original steel, commonly known and still sufficiently defined as blister steel, German steel, and shear steel, is becoming rapidly a thing of the past. It has no value now to the world, except as a useful auxiliary in the manufacture of fine steel. It is disappearing everywhere as an article of commerce, because its functions are performed much better in every way by cast steel. Even as an intermediate product in the manufacture of crucible steel, it has been discarded, almost entirely in Europe, very largely in England, and to some extent in America.

Such being the facts in regard to the gradual abandonment of old methods and the adoption of new and better processes, an effort was made by a few who were familiar with the subject to adapt to the word steel a definition better suited to its present application than that usually found in the books. Although the old definitions of the word attribute to steel, properties which are common to all compounds of iron and carbon, and although they utterly fail to convey any idea of some of the most important properties of cast steel, the effort to adapt a new definition to a new order of things, so ably put forward by Mr. HOLLEY, has been met by argument and ridicule to such an extent that I feel compelled to present you the views of a steel maker before you reach a final conclusion as to what is the most proper nomenclature of iron.

We have been quite a century in growing into our present commercial nomenclature, and we need be in no violent hurry to introduce abrupt changes. We have been told that the application of the word steel, in such compound phrases as homogeneous steel, boiler steel, low steel, mild steel, machinery steel, etc., etc., is an Americanism, and that the matter is much better understood abroad.

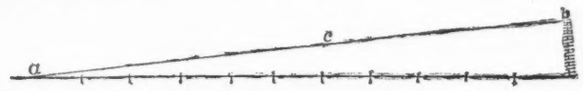
Having met a number of eminent mining, mechanical and railroad engineers from abroad during the past summer, I have taken occasion to observe their language in regard to steel, and I have found, without exception, that they speak of steel as we do; talking familiarly of steel rails, steel tires, steel boilers, etc., etc., as if they knew no other names for these articles, and yet their speech involved the whole range of carburization from less than ·10 of 1 per cent. of C. up to the maximum.

In the United States a very large percentage of all the steel that is produced, excepting for rails, is ordered to be made so that it will barely harden, and from that degree of carbonization, to steel softer than ordinary wrought iron. No one is deceived by the name steel as applied to these products; there is no confusion of ideas either in the minds of makers or workers of them; neither is there any confusion as to what is implied by the terms blister steel, shear steel, or German steel: everything in regard to the nomenclature of steel is entirely harmonious between the makers, the manipulators and the users of it; and this nomenclature is the outgrowth of more than a century of use, and not of a few years, as has been stated in this discussion.

Now, if the few, the men of science, step in and, with the added weight of a very able international committee, say to us—"This is all wrong; you have no business with this word steel as you use it; the ancients said it meant so and so, and beyond this you have 'ingot iron' and not steel,"—what confusion it will work for us, and what trouble! Even if this change were possible and this new name was adopted, who would be benefited by it? Does it simplify matters to complicate them?

Having detained you so long in giving the reasons for disregarding the old definition of steel, and leaving out of consideration blister, German, and shear steels in forming a definition to suit the present condition of affairs, I will only add that I have dwelt upon this part of the subject at such length because the objection that the new definition leaves out the above steels is to my mind the only one yet made that is based on sound reasoning. Nevertheless, it is not insuperable, because the articles themselves have lost nearly all commercial and practical value; and as long as they have any existence at all, there is no more impropriety in calling them specific kinds of steel than there is in our every-day talk about lead-pencils, from which every trace of lead has long been removed.

In discussing the mechanical, structural, and chemical similarities and differences of the three general classes of iron, my remarks will apply to cast iron, wrought iron, and *cast* steel only. I will consider, first, the two most similar classes—cast iron and cast steel, and will regard them with reference to carbon and iron alone.



If a series of horizontal distances be allowed to represent well-defined grades of cast steel and cast iron, and a series of vertical distances to represent the percentages of carbon to iron in these various grades, the highest percentage of carbon known in cast iron being the point *b*, at a given distance above one end of the horizontal line, and the lowest percentage of carbon known in cast steel being at the other end of, and in the horizontal line at, the point *a*,—or, more properly, let the point *a* represent pure iron,—then a straight line from *a* to *b* will contain the carbon points for every grade of cast iron and cast steel between the extremes given. We will call *a b* the "carbon line," and *a c* the part of the line belonging to steel, and *b c* the portion belonging to cast iron.

I propose now to show that in some respects there is a continuity of properties from *b* to *a*; in other respects a similarity of properties in the portions *b c* and *a c*; in still other respects an inversion of properties; and in others an entire difference.

From this discussion I expect to deduce the conclusion that to cause any arbitrary break in either of these portions of the line, based upon the idea that at the point where the line was broken certain properties ceased to exist, would, in the present state of our knowledge, simply be absurd.

1. In reference to structure, as it appears in the fractured ingot, or pig.

Beginning at *b*, we have a very coarse-grained, dark leaden gray, and brightly lustrous fracture; as we move toward *c* the grain becomes finer, the leaden turns to iron gray, and the lustre grows dim, until we have a fine-grained, lustreless gray iron. Farther down the line the grain assumes a mottled appearance and lighter color; then farther along, the mottled surface is interspersed with white spots, which gradually increase in size as we move along, until finally the surface is so nearly entirely white as to contain only a few gray specs. These different fractures are known as coarse gray, gray, fine gray, mottled, mottled and white, white and mottled, and white iron.

In dealing with cast iron of uniform character, I believe that differences of one-tenth of one per cent. of carbon can be observed with certain accuracy.

Now, from white iron to white steel we have an unexplored region; but it is safe to assume that the change in structure from one to the other is so gradual that there is no exact point, *c*, of separation between cast iron and cast steel.

Beginning again at *c*, considered as the highest commercial steel, we have a bright silvery lustre, and an appearance of large crystals shaded alternately light and dark. The high steel and the high cast iron, speaking in a commercial sense, are very similar. As we go down towards *a*, the lustre gradually disappears, the bright crystals separate, and amorphous gray spaces appear; the gray grows larger and the crystals smaller, until we reach a fine gray, amorphous, lustreless grain; and finally, the grain grows larger, the color becomes darker, and the lustre more brilliant, until we reach a point where it is difficult to obtain a fracture. Differences of one-twentieth of one per cent. of carbon can be observed in steel with the utmost certainty.

In structure, then, we have an inversion of appearances, the greatest total of carbon resembling the minimum, and so on to the point of meeting. Although the difference in appearance of any two similar grades as I have mentioned them, is such that steel could not be mistaken for cast iron, yet it would be very difficult to describe the difference in words so that the description would be a guide to a learner.

2. *Specific Gravity.*—Regard the whole series from *b* to *a* as having cooled from a state of fusion without interference; or as iron and steel usually cool, and the specific gravity will increase regularly from *b* to *a*. The ordinary commercial extremes being about 7·14 to 7·855, and, as far as I have been able to verify given specific gravities by chemical analyses, there is no break in this rule, and there is no reason why there should be any deviation from it. In regard to hardness, however, there is no connection between this property and density. The extreme of hardness is somewhere about *c*, and the extreme of softness is at *a*, while cast iron also becomes softer as the carbon increases.

3. *Tensile Strength.*—The tensile strength of cast iron increases regularly from *b* up to where the specific gravity is from 7·3 to 7·33, and then decreases up to specific gravity 7·4, or to as high density as we have recorded.

The tensile strength of steel is a maximum at about carbon ·9 of 1 per cent. of carbon, and falls nearly 25 of C, to carbon 1·2 of C, and rather more than 40 of *c*, to carbon ·3, and becomes less as the carbon is diminished, to the lowest points that are recorded. Here, then, we have a similarity of properties in the two classes, cast iron and cast steel.

* A paper read before the American Institute of Mining Engineers, at the Philadelphia meeting, October, 1876.

4. *Resistance to Compression.*
5. *Resilience.*

In reference to resistance to compression and resilience, the data in the case of cast iron are so incomplete and indefinite that I will not attempt a comparison.

6. *Hardening.*—It is recorded that cast iron of carbon 4·0281 has been hardened to a depth of 1 inch by pouring the iron, completely fused, into a thick cast-iron mold. It is also stated that very gray iron may be almost completely chilled by heating it very much hotter than its melting point, and pouring it at that temperature into a strong cast-iron chill. This gives us the hardening temperature of *b*, at some unknown point above its temperature of fusion. If different lots of cast iron, varying in carbon from *b* to white iron, by regular differences, be melted and poured into chills of uniform size; the pieces, when cold, will be found to be harder and chilled deeper, each than the other, in regular order down the carbon line. Until recently I had supposed that no cast iron could be perfectly hardened so as to be entirely free from little specks of graphitic carbon; but I succeeded, by taking iron so white as to be itself almost free from graphitic spots, and pouring it, thoroughly melted, into a chill of small section, in chilling it so that no black spots were to be seen in the fracture. Hence the hardening temperature of white cast iron is the temperature of fusion. Passing now to steel, and beginning at *c*, we find that the highest steel may be hardened through quite uniformly at a moderate red heat.

As we pass down the carbon line, a higher heat is required for each successive piece of steel, in order to harden it through and refine it. Finally, we come to a point where a white heat is necessary, and beyond that the pieces remain soft in the center, the soft center increasing as we go down, until apparent hardening ceases at about ·2 of 1 per cent. of carbon. Below this point, if we resort to fusion, we will find that upon being chilled the steel will take a crystalized form, strongly resembling the crystals in cast-iron chill; and the farther we go down the line, the more decided this effect will become.

But these crystals will not be hard, as they are in cast iron, owing to insufficiency of carbon; and this fact leads to the idea that the structure of chill is due to iron rather carbon, while the hardness is regulated by the carbon present.

From the point where ordinary hardening is plainly perceptible, down to the lowest attainable point in the carbon line, we have means of determining the effect of the hardening process, and so also approximately the quantity of carbon present. One very reliable test is by bending—similar to that used by the Newburg blacksmith, referred to in one of the discussions of this subject; with this difference, however, that in very low steel the test has real value and is reliable, while in high steel the results obtained by the "blacksmith" were simply worthless in comparison with the reliable results obtained in a different way by steel makers. When the bending test ceases to be operative, cold forging serves a very good purpose, and lastly we try a welding test. When steel is so mild that it will not weld, it may be whittled with a common pen-knife, and at this point practice ceases.

To what changes shall we attribute this hardening? Some say it is due to a chemical combination of iron and carbon. This is possible, but it is not yet fully proved. It has also been attributed to compression caused by sudden contraction. I think there are good reasons why this is not probable, if at all possible. A French writer has suggested that it is owing to a change in the carbon itself, from an amorphous to a crystalline state. I think this suggestion is well worth investigation.

7. *Tempering.*—The whole series from *a* to *b* present exactly the same characteristics in tempering. Tempering is simply annealing slightly. Annealing is the softening of any piece under treatment by raising its temperature. For every increment of heat there is an increment of softness, up to the softness of liquidity. It has been offered as an argument that low steel is not steel; that such steel plunged at a red heat into cold water will not be hardened, but will be "water annealed."

There is no such thing as "water annealing"; it is a misnomer. If a piece of steel be heated to any temperature below its hardening temperature, it will be softened whether it be cooled slowly in dry ashes or rapidly in cold water; neither the ashes nor the water have anything to do with the annealing. The mode of cooling merely regulates the amount of annealing, or softness, that may be retained at the temperature known as cold.

If in the hardening of steel or of cast iron the two elements under consideration—iron and carbon—form definite compounds, and any one can tell us just where the formation of these compounds begins, and just where it ends; if we can be told, at this point you have hardness, and below this point you have no action, we will gladly drop the subject. Pleased at being so enlightened we will accept the dictum of our instructors, and agree that up to such a point we have iron; from there we have steel to another fixed point; and from there we have cast iron. Until we are so informed we must be guided by what we know. We know that the effects of changes of temperature, whether sudden or gradual, are practically and accurately observable in every grade of cast iron or cast steel that is known to commerce. The mercury in the thermometer is not more sensitive to the action of heat than are homogeneous irons of any composition; neither does the mercury show any more clearly the warmth or coldness of the air than does the grain of any homogeneous iron indicate the amount of heat to which it has been subjected; and, farther, either the structure of any ingot of steel, or pig of iron; or the behavior of the bar of steel under treatment, mark its proper place in the carbon line, no matter where that place may be.

Therefore, we feel justified in calling everything in the line *a b* either cast steel or cast iron; and, reasoning from the facts given, does it not seem absurd to suppose that a certain action ceases at some unknown indeterminate point in this line, and yet that a century of observation and manipulation have failed utterly to disclose this remarkable break in the operation of a natural law? Does it not rather seem that such a conclusion is unscientific in the extreme? You would hardly say that salt water ceases to be salt to the tongue that cannot taste it. Neither would you insist that the earth does not revolve upon its axis because you cannot see it spinning around.

Yet because a file, or a hammer, or some such sensitive instrument fails to reveal a perceptible degree of hardness in a piece of steel after it has been treated in a certain way, it is assumed that the action of the carbon in that piece of steel has ceased; and without presenting any reason why that action should have ceased and this wonderful law of change should have become inoperative, we are to agree that this thing has happened, because we cannot see in the ordinary way that it has not happened.

We can now examine this line *a b* and the two classes of iron it represents with reference—1. To a continuity of properties; 2. To a similarity of properties; and 3. To a difference of properties.

1. *Continuous Properties.*—The variations in total iron and total carbon are continuous throughout the line; the specific gravities vary with the carbon and iron, increasing all the way down, as the carbon diminishes. Expansion and contraction due to changes in temperature are continuous through the whole series.

2. *Similar Properties.*—Resistances to stress present similar variations in each series, in every kind of strain, as far as we have any information on the subject.

3. *Different Properties.*—There is the structural difference that the fracture at *b* resembles the fracture at *a*, and the fracture of the highest steel resembles the fracture of the cast iron lowest in carbon. In normal hardness the hardness of steel increases with the carbon, while in cast iron the hardness diminishes as the carbon increases. In the hardening property, the hardening temperature of steel increases as carbon diminishes, while in cast iron the hardening temperature increases as the carbon increases. There is the important mechanical difference that cast steel can be forged, and cast iron cannot be forged. There appears to be a chemical difference, or perhaps more properly, a chemical distinction.

It would seem from the greater strength and ductility of steel, and also from the greater perfection of its hardening properties, that steel contains carbon within the limits of saturation, or within such limits that all of the carbon operates for the production of desirable effects, while cast iron contains carbon beyond this limit of saturation, or in such large quantities as to cause it to be non-forgeable, brittle and lower in resistance to every stress than cast steel. The most remarkable fact in this connection is that this excess of carbon should not act continuously to increase brittleness and diminish strength. On the contrary, it has been shown that if the line *a b* were to be broken at *c*, and the point *b* were to be placed below *a*, so that *a c* and *b c* should be parallel, and the lines of resistance to stress were to be laid off upon each line so as to show the differences due to variation in carbon, these lines would be nearly or quite parallel.

We come now to consider the third general class of iron—wrought iron. There is no question as to the proper relation of wrought iron to cast iron, and I will pass at once to the comparison of wrought iron and cast steel.

Wrought iron is generally conceded to be non-homogeneous; it has no serial conditions such as we have discussed in cast iron and cast steel, its quality depending upon its freedom from impurities and the perfection of its manipulation. Wrought iron is non-homogeneous because it consists of alternate layers of iron and cinder, and therefore its structure can never be similar to that structure of iron which has been produced by fusion, and which cannot be laminated.

In ductility and most physical properties there are strong resemblances between wrought iron and very mild cast steel, to which ample importance has been attached. It has been claimed that wrought iron and an ingot made from fused wrought iron are the same chemically, and it is very possible that a piece of wrought iron and a piece of cast steel might be found which, under analysis, would yield identical results in columns of percentages of carbon, silicon, phosphorus, etc.; but if the piece of wrought iron were to be thoroughly fused, a considerable amount of slag would rise to the surface of the molten metal; and by skimming off the slag and pouring the iron into a mold we would produce an ingot of cast steel. It is difficult to conceive how the ingot minus the slag could be chemically the same as the iron including the slag. In physical properties experience teaches us that the ingot will be more ductile, the bar made from it will be stronger, and in every way the cast steel will be superior to the iron from which it was made.

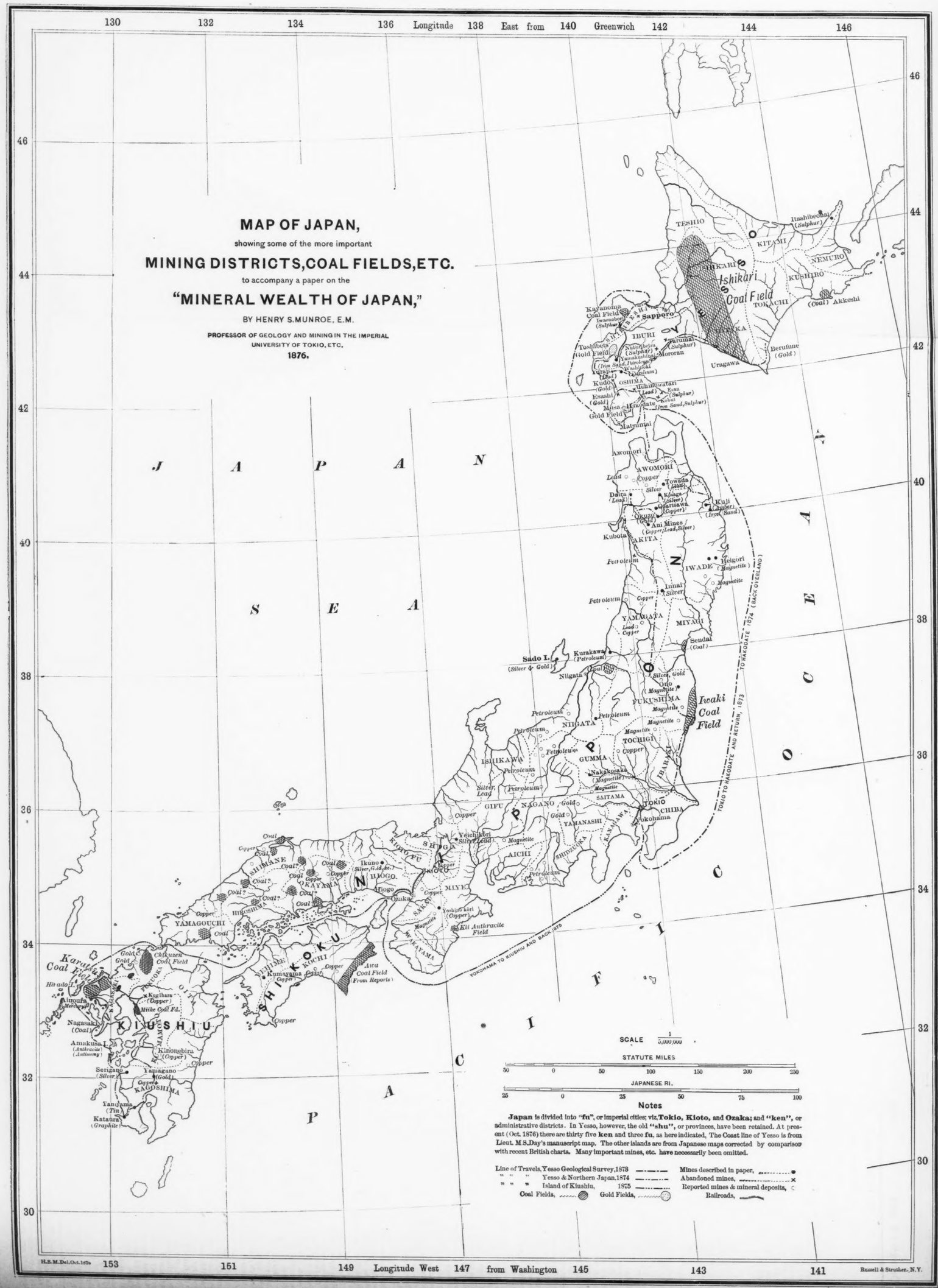
Gentlemen object to limiting the definition of the word steel to the products of the crucible, because originally it applied only to a property of carbon and iron combined; now if the original limitation is to be adhered to, we may say cast iron is steel, because this property of hardening continues all through the cast-iron series. If it is improper to change the definition of a word so as to adapt it to its largest use, is it not still more improper to introduce new names into important places when there is no reason for abandoning old names which are well understood and entirely explicit? The name *cast steel* belongs exclusively to the products of the crucible, the Bessemer converter, and the open hearth; and the only change necessary to make Mr. HOLLEY'S definition entirely unobjectionable, is to use in place of the word "steel," the compound descriptive word *cast-steel*, which has been in use for more than a hundred years.

Those who object to any word which involves an allusion to a mode of manufacture, probably talk serenely about igneous rocks, metamorphic rocks, and sedimentary rocks, and rejoice in the beauty of a nomenclature which describes the thing and its mode of manufacture in one word. Neither have we heard any objection from this source to the similar name—"cast iron"—which is applied to the more highly carbonized irons; and possibly the caricature from which "pig iron" derives its name has not presented any idea of inconsistency to their minds, or else they would not attempt to misapply the word "ingot" to an indeterminate portion of the steel series, inasmuch as it is derived from an intermediate condition of cast steel, which bears the same relation to cast steel that pig iron does to cast iron.

I appeal from the decision of the committee on nomenclature, and join those who object to changes and new names, which will cause confusion. Let us have the old names—cast iron, wrought iron, and cast steel. Define cast iron as iron which has been made homogeneous through fluidity, and which contains so much carbon that it cannot be forged; wrought iron as iron which is not homogeneous because it was not produced by fluidity, and which can be forged; cast steel as iron which has been made homogeneous through fluidity, and which contains so little carbon that it may be forged.

This nomenclature and these definitions would be accepted by the world at large because the names are familiar household words, and the definitions are simple and easily to be understood; they would be acquired readily by the student, and would not present to his mind any confusing or startling ideas. As a crowning beauty to this nomenclature, lovers of deep and intricate argument would still have the simple word "steel" to ponder over, and the question "What is steel?" and the answer—"What steel is," would furnish food for discussion until the next Centennial; although in the meantime, the toilers in iron might wag along in peace and harmony.

AMERICAN ENGINES IN EUROPE.—The first American steam-engine in Holland was sent there some six months ago. The firm which received it has since ordered seven more; and, says the *Moniteur Industriel Belge*, American engines are competing with English ones not only in Holland, but all over Europe, and not with English engines only, but with all European makes, so that it seems as if American engines would be found in all European markets, while no European engine will be found in any American market.


MAP OF JAPAN,
showing some of the more important
MINING DISTRICTS, COAL FIELDS, ETC.
to accompany a paper on the
"MINERAL WEALTH OF JAPAN,"
BY HENRY S. MUNROE, E.M.
PROFESSOR OF GEOLOGY AND MINING IN THE IMPERIAL UNIVERSITY OF TOKIO, ETC.
1876.
Longitude East from Greenwich
130
132
134
136
138
140
142
144
146
153
151
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147
145
143
141
Longitude West from Washington
46
44
42
40
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36
34
32
30
JAPAN
SEA OF JAPAN
PACIFIC OCEAN
YESSO
HONDO
SHIKOKU
KIUSHIU
TESHIO
KITAMI
ISHIKARI
HIDAKA
KUSHIRO
NEMURO
Ishikari Coal Field
Iwaki Coal Field
Karatsu Coal Field
Chikuzen Coal Field
Aioi Coal Field (From Reports)
Kii Anthracite Field
Sapporo
Hakodate
Matsumai
Awomori
Sendai
Niigata
Sado I.
Kurakawa (Petroleum)
Yokohama
Tokio
Nagasaki (Coal)
Amakusa I. (Anthracite) (Antimony)
Serigano (Silver)
Yamagano (Gold)
Yamada (Tin)
Kataura (Graphite)
Kinonebira (Copper)
Kagoshima
Hirado I.
Almoura (Anthracite)
Mitike Coal Fd.
Kugihara (Copper)
Ani Mines (Copper, Lead, Silver)
Ohuno (Gold)
Kosaka (Silver)
Marisawa (Copper)
Towada (Lead)
Daite (Lead)
Kuji (Copper) (Iron Sand)
Heigori (Magnetite)
Iwate (Magnetite)
Ohno (Silver, Gold)
Ohno (Magnetite)
Nakakosaka (Magnetite)
Yoichi (Silver, Lead)
Ikuno (Silver, Gold, &c.)
Yoshino kori (Copper)
Akkeshi (Coal)
Itashibeshi (Sulphur)
Berufume (Gold)
Uragawa
Toshibets Gold Field
Kudoi (Gold)
Esashi (Gold)
Misu Gold Field
Iburi (Coal)
Iburi (Iron Sand, Petroleum)
Yamakoshinai (Sulphur)
Moroyama
Toyoha (Lead)
Uchimuratari (Lead)
Esan (Sulphur)
Kobui (Iron Sand, Sulphur)
Karumai (Sulphur)
Nabuchi (Sulphur)
Kawayama (Sulphur)
Iwaonobori (Sulphur)
Karafuto (Sakhalin) Coal Fields
Petroleum
Copper
Lead
Silver
Gold
Coal
Magnetite
Graphite
Tin
Antimony
Anthracite
Sulphur
Iron Sand
Petroleum
Coal?
TO HAKODATE 1874 (BACK OVERLAND)
TOKIO TO HAKODATE AND RETURN, 1873
YOKOHAMA TO KIUSHIU AND BACK 1875
SCALE 1/5,000,000
STATUTE MILES
50 0 50 100 150 200 250
JAPANESE RI.
25 0 25 50 75 100
Notes
Japan is divided into "fu", or imperial cities; viz. Tokio, Kioto, and Ozaka; and "ken", or administrative districts. In Yesso, however, the old "shu", or provinces, have been retained. At present (Oct. 1876) there are thirty five ken and three fu, as here indicated, The Coast line of Yesso is from Lieut. M.S.Day's manuscript map. The other islands are from Japanese maps corrected by comparison with recent British charts. Many important mines, etc. have necessarily been omitted.
Line of Travels, Yesso Geological Survey, 1873
" " " Yesso & Northern Japan, 1874
" " " Island of Kiushiu, 1875
Coal Fields
Gold Fields
Mines described in paper
Abandoned mines
Reported mines & mineral deposits
Railroads
H.S.M.Del.Oct.1876
Russell & Struther, N.Y.

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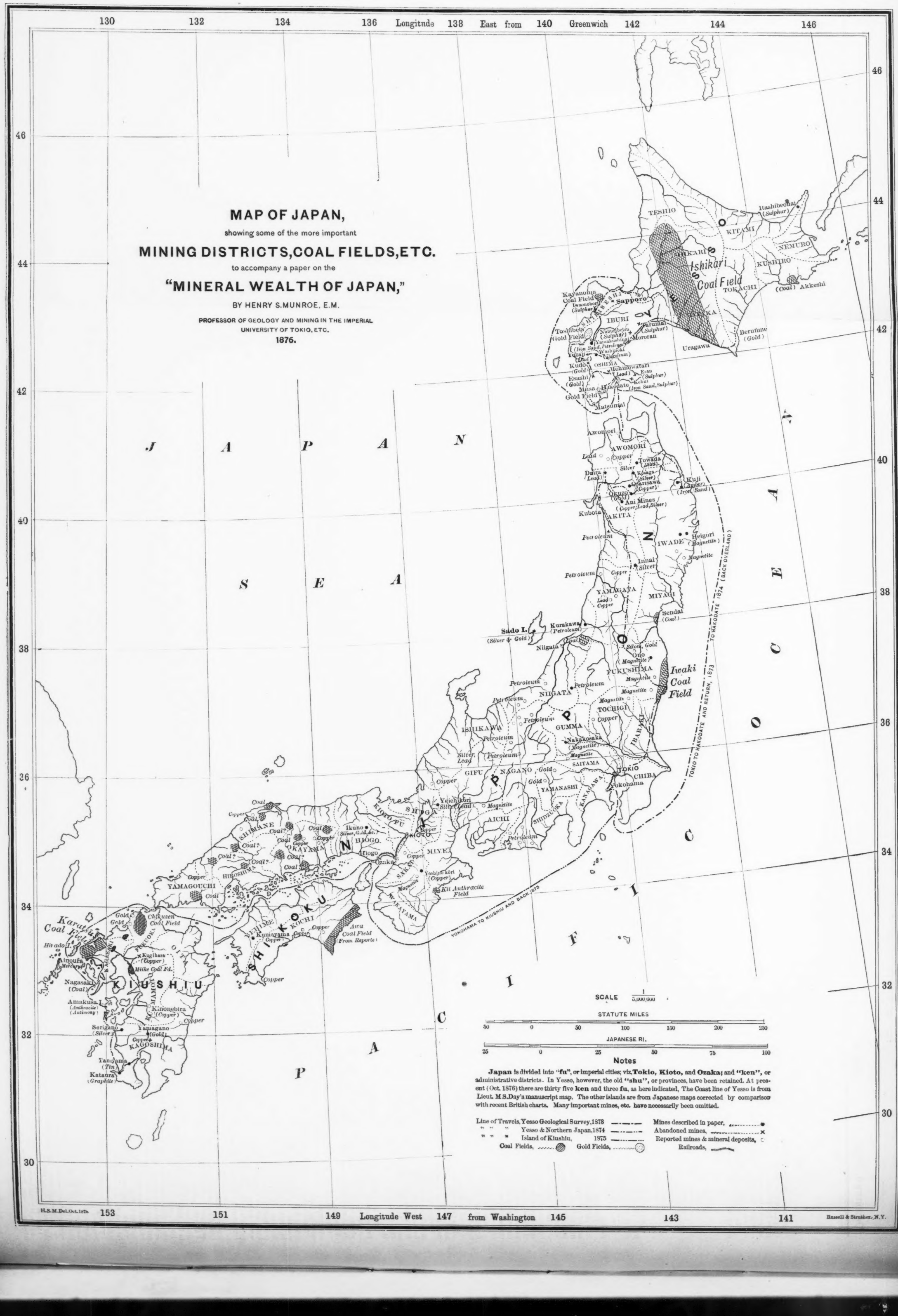

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Coal Fields, ▨ Gold Fields, ▨
Mines described in paper, ●
Abandoned mines, ×
Reported mines & mineral deposits, ○
Railroads, ═══

H.S.M.Del.Oct.1876 Russell & Struther., N.Y.

THE MINERAL WEALTH OF JAPAN.*

By Henry S. Munroe, E.M.

(Continued from page 364.)

PRESENT CONDITION OF JAPANESE MINES.

ACCORDING to the records of the Mining Office,† there were in 1874 no less than 1,856 productive mines in Japan, and in the same year 637 permits to explore for minerals and metals were granted. Of this large number of mines, my own observations lead me to believe that not more than four or five per cent. are actively worked; and these few supply sixty to seventy per cent. of the total product of the empire.

The following table gives the mineral product of Japan, for 1874, as estimated by Mr. J. G. H. GODFREY, Chief Engineer of the Mining Office‡:

MINERAL PRODUCT OF JAPAN.—1874.

1. Coal	390,000	tons	(2,240 lb.)
2. Iron	5,000	"	"
3. Copper	3,360	"	(2,000 lb.)
4. Lead	207	"	"
5. Tin	8·4	"	"
6. Silver	312,000	oz.	troy.
7. Gold	12,000	"	"
8. Petroleum	275,000	gallons.	

Compared with the yield of the country in the times of the Portuguese and Dutch trade, this table shows a great falling off; particularly in the production of gold and silver. This falling off is mainly due to two causes, viz.:

1. The increased and increasing value of labor.
2. The exhaustion, real or practical, of the richer or more easily worked deposits.

1. The first cause, the rise in the value of labor, is still operative, and can be only partially overcome by labor-saving appliances. In fact, the value of labor has not yet reached its proper level, and will certainly continue to rise for some time to come. This cause alone will prevent most of the abandoned mines from being reopened with profit, even with the aid of the most approved methods of mining.

2. Many of the best mines of the country have been exhausted as far as the lowest natural drainage level; the workings having been carried to considerable depths, and the life of the mine prolonged to the utmost limit, by the aid of long drainage tunnels, run with great skill, and often requiring the patient work of generations for their completion. These mines cannot now be worked for want of means to get rid of the water, the Japanese pumps and water-buckets being capable of dealing only with small quantities of water and moderate depths.

There are doubtless a number of really valuable mines in the country, particularly of silver and of copper, which, for this cause, either have been abandoned, or are worked on a small scale in the upper levels only. By the use of small mining pumps, driven by steam or compressed air, most of these mines can easily be reopened. By the introduction of better tools, skilled labor, improved methods of mining, and a more rational system of administration, they can be worked with profit.

In most cases, these mines, if reopened, will not yield large profits, owing to changed conditions and the poverty of the deposits. There are, however, a few mines which are exceedingly rich, some of which are even now yielding more or less profit, though worked in the most careless and extravagant manner. As a rule, indeed, the richer the mine, the greater the mismanagement. These mines, properly worked, would undoubtedly prove exceedingly valuable.

Much has already been done toward improving the art of mining in Japan. Two members of this Institute, Messrs. BLAKE and PUMPELLY, who visited that country about fifteen years ago, had the honor to introduce the application of powder in mining; and, although the miners have but imperfectly mastered its use, they have been enabled thereby to undertake many works otherwise impossible.

Other engineers have since visited Japan; some merely to examine and report upon particular mines or districts, some to open mines and establish smelting works.

The Government Mining Office has under its direction a large number of mines, four or five of which have resident foreign engineers with efficient foreign assistants. In this way large bodies of Japanese miners and furnacemen are being trained, and foreign methods and processes introduced in the most effectual manner. Incidentally, some of these mines have already been made to yield pecuniary profit; eventually, it is expected, all will at least pay expenses. Until within a year or so the mines available for these governmental experiments were, for the most part, those which yielded little or no profit by Japanese methods; the richest mines being under the control of private parties. The temporary losses resulting from the working of these poor mines will, however, be more than balanced by the advantages gained by the the introduction of improved mining methods; and when the operations of the Mining Office are extended to the richer mines which have recently come under its control, large pecuniary profits will certainly appear.

All these advantages might, however, be far better attained, and attained at much less expense, by private enterprise. The capitalist, whose fortune is sunk in the mine, demands of the engineer in charge a rigid account of every expenditure; and an economy of working is thus secured which is impossible under the perfunctory supervision of government officers. In conducting experiments and making explorations for private parties the engineer is forced to feel that economy is of the first importance; and while he is thus fettered to some extent, and often obliged up to give some pet scheme, still the restraint is wholesome, and gives a powerful incentive to careful thought and well-digested plans of work. Engineers may of course be found who will do as good and as careful work for a government as for private capitalists; but they do this from a sense of duty alone, knowing that their efforts are not likely to be appreciated.

From private enterprise will result economy of working, and therefore increase of profits. Better methods will be selected, and experiments and explorations will be more carefully conducted. The government also, no less than the country at large, may reap direct advantage from the introduction of private capital; for, by a system of royalties, it may obtain revenue as great as, or even greater than, that now realized by working the mines. The capitalist will be amply repaid if he saves and secures the money which under government would have been wasted, and might in some cases safely agree to pay as royalty twice or three times the profits obtained under governmental supervision.

Some means must, of course, be taken in such case to prevent wasteful mining, which is sometimes most profitable, and to secure the safety of the miner, which is often disregarded. With carefully-framed laws and occasional governmental inspection these evils may be, in great measure, prevented, and all the benefits of private enterprise secured.

These benefits cannot, I fear, be secured by the use of Japanese capital. If familiar with mining enterprise, the Japanese capitalist usually invests his money in some mine which is yielding a profit by Japanese methods of working; and, even though this profit may be small, he is naturally unwilling to jeopardize it by changing the plan of work for foreign methods with which he is unfamiliar, especially as he sees that most of the government mines, where these foreign methods are employed, are now worked at a loss. And, on the other hand, in case the Japanese capitalist adopts foreign methods, he would in most cases be suspicious of the foreign engineers in his employ, and would harass and hamper them by his want of confidence. Finally, through his ignorance of these new methods of mining, he would be unable to properly check the expenditures, and thus the most important element of success, the oversight and control of the owner, would be wanting.

At present, by the Japanese mining laws, no foreigner is permitted to have pecuniary interest in a Japanese mine, and the governamental permits to explore or mine become null and void if transferred wholly or in part to a foreign capitalist. In view of the objections to Governmental mining and to the use of Japanese capital, it would seem highly advisable that this law should be altered or repealed. The introduction, under proper restrictions, of foreign capital, either alone or, better, associated with Japanese capital, offers the best and cheapest means for realizing the advantages of foreign mining methods, and securing the best services of foreign mining engineers.

A number of Japanese students have been sent abroad to study mining; others are beginning a similar course of study in their own country, in the Engineering College of the Department of Public Works; and the Department of Education proposes to establish a Mining College, in connection with the University of Tokio. These students, when they finish their respective courses of study, though hardly competent to take charge of large works, will be of great service as assistants to foreign engineers, and at the same time may obtain the necessary practical experience to fit them for positions of greater responsibility. When the mines of the country shall be under the supervision of well educated and experienced Japanese engineers, the objections to the use of Japanese capital disappear. But this, of course, will not be possible for many years.

JAPANESE COAL FIELDS.

By far the most important of the mineral resources of Japan, though at present but imperfectly known, and still more imperfectly developed, lies in the large and numerous deposits of coal found in so many parts of the country. Coal occurs in all its varieties—peat, bogwood, lignite, brown coal, bituminous coal, both dry and coking, anthracite and graphite. Out of the thirty-eight *ken** and *fu* into which Japan proper is divided, coal is found, or reported to occur, in at least thirty-five, anthracite coal in two, bituminous coal in eleven, and lignite in sixteen. In the case of the other six *ken* I have learned, from various sources, the fact of the occurrence of coal, but not as yet its kind.

The following table, based on my own notes and on other sources of information, will indicate something of the extent and character of the more important of the Japanese coal fields:

JAPANESE COAL FIELDS.

Island.	Name of Coal Field.	Estimated Area. Sq. miles.	No. of Workable Seams.	Thickness of Seams. feet.	Est'd. Thickness of Coal. feet.	Kind of Coal.
Yesso	Ishikari Coal Field, upper measures	600	6-12	2 to 19	45	Bitum., dry and coking.
"	Ishikari Coal Field, lower measures	2,400	4	2 to 4	10	" dry coal.
"	Kayanoma Coal Field	1	12	2 to 7½	50	" dry and coking
"	Akkeshi Coal Field	.....	4	2 to 3	10	" dry coals.
"	Iwaki Coal Field	200	2+	4½ to 6	10+	" " "
Nippon	Nügata Coal Field	.....	....	....	..	" " "
"	Kü Anthracite Field	.....	....	....	..	Anthracite Coal.
"	Awa Coal Field	200	....	....	..	Bitum., dry and coking.
Shikoku	Chikuzen Coal Field	300	....	....	..	" dry coals.
Kiushiu	Karatsu Coal Field, upper measures	350	3+	3 to 4	10+	" dry and coking.
"	Karatsu Coal Field, lower measures		10	1 to 2	15	" dry coal.
"	Nagasaki Coal Field,+	2	13 ?	3 to 16	50	" coking.
"	Müke Coal Field	25	3 ?	4 to 8	15	" "
"	Amakusa Anthracite Fields.	10	2+	2 to 3	5+	Anthracite.

Total Area of Coal Fields, about 5,000 square miles.
Average thickness of Coal.....15 feet.

+ Including Takashima and other islands in Nagasaki harbor.

The area of the Ishikari coal fields is calculated on the supposition that the coal rocks are continuous between the Ishikari Valley and the exposures of the same rocks on the south coast. This continuity has not been proved, but seems probable. The area of the Kayanoma fields was determined by actual survey. The areas of the Iwaki, Karatsu, Nagasaki, and Müke coal fields are estimated from data obtained in visits to these places. The estimated area of the other fields is based on well authenticated reports of coal at many localities within the assigned limit.

Allowing for fields whose area is yet unknown, and for coal areas not included in the above table, it seems probable that the total area of the coal fields of Japan is not far from 5,000 square miles, as stated above. Assuming that of this area one-eighth only is underlaid by the upper measures, with fifty feet of coal, the average thickness must be at least fifteen feet.

COAL FIELDS OF YESSO.

The coal fields of Yesso, probably the most important of Japan, have been very thoroughly explored by Mr. LYMAN and his party in the course of his

* A paper read before the American Institute of Mining Engineers, at the Philadelphia meeting, June. 1876.

† Quoted by Mr. PLUNKETT, Mines of Japan, p. 2.

‡ Private communication. See also Mines of Japan, p. 5, and Official Catalogue, Japanese Section, Phila. 1876, p. 39.

*The former division of Japan into provinces (or *shu*) is now retained only in Yesso. The remainder of the empire excluding three *fu*, or imperial cities, Tokio, Kioto, and Ozaka—is divided into administrative districts, or *ken*. Of these *ken* there were, in October, 1876, thirty-five.

Yesso Survey, but until his final report shall be published we can give but a general idea of their extent and character.

There seem to be three areas of coal-bearing rocks in Yesso : the Kayanoma coal field, the Ishikari coal field, and the Akkeshi coal field. Of these the Kayanoma field is small, less than a square mile in area, and the Akkeshi field is unimportant, as containing little or no workable coal. In the Ishikari field I include the Hormuui, Sorachi, and other coal regions of the Ishikari Valley, the Makumbets coal to the south, and the Rurumoppe coal of the northwest coast.

It seems probable that this coal field extends continuously from the southern coast of Yesso, in the province of Hitaka, northward through the province of Ishikari nearly or quite to the northwest coast in Teshio province, a distance of about one hundred and fifty miles, with an average breadth of twenty or twenty-four miles.

The thick seams of coal seem to be confined to the upper measures ; and these measures, constituting the more valuable portion of this large coal field, are found only in the middle of the island and in the Ishikari Valley. The attention of the survey has been directed chiefly to this portion of the field.

On the Sorachi River there are twelve seams of coal exposed, all but one within a total thickness of three hundred and fifty feet of rock. The upper seam, about five feet thick, is separated from the others by 1,200 or 1,300 feet of sandstone. The different measurements of these coal seams show great variation in thickness, perhaps due to the fact that they were made on the outcrops, but probably due to the varying thickness of the beds themselves. The following are the average of the different measurements given by Mr. LYMAN, deducting bony coal and shaly partings in each case, and beginning at the upper coal, viz. : 5·10 feet, 2·75 feet, 18·6 feet, 2·15 feet, 2·10 feet, 3·40 feet, 2·60 feet, 7·00 feet, 2·15 feet, 2·70 feet, 8·70 feet, 7·25 feet ; total sixty-four feet of workable coal.* Thickness of measures, five thousand feet : 1,500 feet above the upper coal, 1,300 feet between this coal and the second seam, and about 1,800 feet below the 350 feet of production measures.

On the Horumai, 25 miles south of the Sorachi, and still in the Ishikari Valley, these same coals are again exposed, but the beds are neither as numerous nor as thick. Mr. LYMAN's section† shows ten seams of coal in about three hundred and fifty feet of rock ; of which six only contain good coal of workable thickness, 4·20 feet, 5·00 feet, 2·00 feet, 5·00 feet, 2·80 feet, and 6·90 feet respectively, giving a total thickness of about twenty-six feet of coal.

Near the south coast, in the province of Hitaka, a detailed survey of a portion of this same coal field was made by the Japanese assistants under my direction, which resulted in finding four coal seams of workable thickness, 2·3 ft., 2·6 ft., 3·5 ft., and 4· ft., the last reported not measured. The total thickness of rocks, sandstone and shales was about 2,250 ft., the coal seams being within 370 ft. According to Mr. LYMAN, this section corresponds to that of a portion of the lower coal measures exposed in the Ishikari valley. The coal is of inferior quality.

Similar thin beds were found at the northern extremity of the field, near the northwest coast, but the indications there were even less favorable.

Of the three thousand square miles covered by this Ishikari coal field, about six hundred square miles are known to be underlaid by the upper measures with twenty-six to sixty feet of coal, and it is probable that further explorations may extend this area. The remainder of the field, where the lower measures alone occur, with only three or four thin seams of coal, will prove of little value.

The coals of the lower measures have not been assayed, but they seem inferior, and probably contain large percentages of ash.

The coals of the upper measures of this field have not as yet been mined, though several tons of samples and specimens have been brought from the different outcrops in the Ishikari valley. The lower coals have been mined in two places in Hitaka province, near the south coast, but after taking out forty or fifty tons at each place the work was abandoned.

The Kayanoma Coal Field is in Shiribeshi province, on the west coast of Yesso. The area of this field is somewhat less than a square mile. The section‡ given by Mr. LYMAN shows twelve seams of fair and good coal of workable thickness, respectively 4·00 ft., 2.67 ft., 5·75 ft., 2·30 ft., 5·68 ft., 3·39 ft., 2·25 ft., 5·80 ft., 1·90 ft., 6·08 ft., 2·60 ft., and 7·40 ft. thick. All these seams are contained within less than six hundred feet of strata. The total thickness of workable coal would seem to be nearly fifty feet.

The coal is not so good as that of the Ishikari field, containing usually six to fifteen per cent. of ash, and in some beds twenty per cent. and more. The water varies from one to eleven per cent., being usually between five and eight per cent. It is, however, a bituminous coal, though of poor quality, and not a lignite. One bed furnishes a very fat, long-flaming, blacksmith's coal, while most of the others are steam coals or dry coals with a long flame, a few only being short-flaming.

A mine was opened here about eight or ten years ago, which was for a time under the superintendence of Mr. E. H. M. GOWER. The work was interrupted by the revolution, and resumed later under Japanese management. At the time of our visit in 1873 the mine was producing, if I remember aright, only about fifty tons of coal per week, and this so badly mined as to be mostly slack.

The Akkeshi Coal Field.—At the northeastern corner of the Island of Yesso there is a large area of coal-bearing rocks ; but coal has been found in only two or three places. Mr. LYMAN gives several sections,§ the best of which shows ten or more small seams of coal, four of which barely exceed the two-foot limit ; and even these are split up into thin benches by thick partings of shale. In other places the showing is even more unsatisfactory ; and, as the coal is only of fair quality, this coal-field promises to be of little importance. A small coal mine was opened by the government here in 1871, but abandoned the next year. Like coal from many other parts of Japan, this sometimes contains small beads of amber (?) or some other fossil resin.

COAL FIELDS OF NIPPON.

Iwaki Coal Field.—On the Island of Nippon coal has been found in many places ; but with the exception of the Iwaki coal field on the east coast, we know little or nothing with regard to the extent or character of the deposits.

This coal field is in the ken of Fukushima and Ibaraki, and about a hundred to a hundred and twenty miles north of Tokio. At the time of my first visit, in December, 1874, I estimated its total length at twenty-five to thirty miles in a north and south direction, along the coast, with a breadth of three to five miles, from the coast to the hills of granite and other metamorphic rocks which form its western boundary. This estimate agrees very closely with that given by Mr. PLUNKETT,* who makes the field thirty miles long by seven broad.

Since the time of my visit coal has been discovered at several places to the north, making it probable that the field is at least fifty miles long. Coal is also reported to occur near Sendai, fifty miles farther north ; but, if this be the case, it is probably another basin, and not a part of the same field.

In this coal field there seem to be but two workable seams, respectively four and a half and six feet in thickness ; but a careful survey would, undoubtedly, show many more. The coal is of only fair quality, containing ten per cent. of ash, and about the same amount of water. It does not coke, belonging to the class of dry coals with a long flame. Coal is mined in a small way at several places in this field, and is sent by junks to Tokio, where it is used, to a limited extent, for steam and household purposes.

Other Coal Fields in Nippon.—North of the Iwaki coal field there are many small local deposits of lignite, but none of coal. On the west coast, coal is reported to occur in Niigata ken ; from which ken I have received specimens both of bituminous coal and lignite. According to Mr. PLUNKETT, this Niigata coal has been used by the government steamers and at the government gold mines of Sado. The coal is of good quality and abundant ; but the limited local demand, and the want of a good harbor have so far prevented the development of the mines, and the present production is quite small.

Bituminous coal of good quality is also found in many places near the western extremity of Nippon, on the north coast ; and it seems probable that there may be one or more large coal fields in that region. Anthracite coal of excellent quantity, of which I have received several specimens, is found in Miye ken (province of Kii) at the southern end of Nippon. Captain ST. JOHN, of H. M. S. Sylvia, when in the harbor of Katsûra, took on board fifty tons of this coal for trial, which he describes as excellent in appearance, very hard and heavy, and free from dust. Apparently unacquainted with anthracite, he expresses some surprise that this coal, when tested, "simply refused to burn"; when mixed with other coal, however, it did "fairly well."†

COAL FIELDS OF SHIKOKU.

Awa Coal Field.—Coal is reported to occur in many places on this island ; and there is probably a coal field of some size on the east coast. I have specimens of coal from this region which seem to be of fine quality. One specimen, at least, is of a fat, caking coal. Mr. FRECHEVILLE, of the Mining Office, spent the summer of 1875 in exploring this island, of whose mineral resources little is known. His report, however, has not yet been published.

COAL FIELDS OF KIUSHIU.

The most important coal fields of Japan, as being best developed and producing most coal, are, at present, those of the Island of Kiushiu. These yielded, in 1874, eighty per cent. of the total product of the empire. Last summer, with a party of students, I made a rapid trip through this island, under the auspices of the Imperial University, in the course of which we visited all but one of these coal fields.

It seems that there are five important fields on this island, which may be styled as follows, viz. : The Chikuzen Coal Field ; the Karatsû Coal Field ; the Nagasaki Coal Field; the Miike Coal Field, and the Amakusa Anthracite Fields.

The Nagasaki Coal Field.—The most important of these, although of small extent, lies in the harbor of Nagasaki. The available area of this field is not more than a couple of square miles, comprising a few small islands at the mouth of the harbor, and a small strip of the adjoining coast. A vastly greater area lies between these islands, beneath the sea ; but it is, of course, doubtful whether any large portion of this can ever be profitably worked. Certain capitalists have the exclusive right to mine coal on three or four of the largest of these islands. Their energies are at present concentrated on one island (Takashima), where they have a large and well-developed mine under English superintendence. In 1874 this mine produced over seventy-two thousand tons of coal, averaging two hundred and forty to two hundred and fifty tons per working day. In 1875 the production was increased to between three and four hundred tons per day; and, lately, the daily output has reached an average of six to seven hundred tons.

There are reported to be thirteen or more seams of coal on this island, three to sixteen feet in thickness. The upper beds have been in former years exhausted by the Japanese, and but three seams are now worked, the "five feet," and the "eight" and "ten-feet" seams. These last are separated by a parting of shale about one foot thick, and form really one bed, averaging sixteen feet in thickness. Other thick seams are reported ; and there is said to be enough coal on the island to maintain a daily production of four or five hundred tons for seventeen years.

Borings have been made on the other islands showing several seams of coal of workable thickness ; and the company are now making preparations for the sinking of one or more new shafts.

The coal of Takashima Island is of very fine quality, being a fat, caking, blacksmith's coal, with but five per cent. of ash, and one to two per cent. of water. It is the favorite fuel of the various lines of steamers which visit Japanese ports, and the supply by no means equals the demand. In addition to the superior quality of its coal, this Nagasaki field has another great advantage in being situated at the mouth of one of the best harbors in the country. If necessary, large vessels could be loaded with coal at the mouth of the mine. A small navy of junks, and several large hulks and lighters, bring the coal to Nagasaki ; adding, however, but little to the cost.

Their situation, of course, gives these mines a great advantage in competition with those of other regions ; and could they supply the demand, but very little coal would be mined elsewhere in Japan. Even now the miners of other less favored localities look forward anxiously to the time when, as they say, "the Takashima workings shall be drowned out by the sea."

The coal of the Ishikari region alone approaches the Takashima coal in quality, being in some respects, perhaps, even better ; but, as it lies in the interior of the Island of Yesso, the expense of bringing it to market, eighty miles by rail, or by river a still greater distance, places it at a serious disadvantage in competition with the Takashima.

Karatsu Coal Field.—North of Nagasaki, on the west coast of Kiushiu, in Nagasaki ken, lies the large coal-producing area which I have styled the Karatsu coal field, the coal brought from this region being everywhere known

* More than one-half of the coal product of Japan is obtained from beds of coal less than two feet in thickness, and seams even less than one foot thick are worked in many places, though yielding a profit only under very favorable circumstances. Mr. LYMAN in his report assumes three feet as the limit of workable beds, but in view of the above facts this limit seems unnecessarily high. On account of the varying conditions in different parts of the country, and the increasing value of labor, etc., it is impossible to fix the exact limit below which coal beds become unworkable, but if we take two feet as our standard, we shall have abundant margin.

† Yesso coals, Kaitakushi Reports, p. 7.

‡ Yesso coals, Kaitakushi Reports, p. 6.

§ Kaitakushi Reports, 1871-75, pages 411-421.

* Mines of Japan, p. 9—"Shiramisui District."

†Transac. Asiat. Soc. of Japan. Vol. III., part II., p. 37.

as Karatsu coal, though but a small part of it comes from the Karatsu district proper. This field is divided in two places by large and narrow bays, from which many small harbors radiate on all sides. These harbors afford shelter to numerous junks, and facilitate the transportation of coal to market, encouraging the opening of mines at many different points.

In visiting this coal field, I was fortunate in that my road several times crossed the boundaries, so that I am enabled to map the extent, and to approximate very closely to the truth in my estimate of the area of the field. Mr. GODFREY estimates this area at two hundred and sixty-six square miles; dividing it into mining districts—which have, however, no natural boundaries—as follows:

Imabuku District	70	square miles.
Taku "	36	" "
Karatsu "	40	" "
Hirado "	120	" "
Total estimated area	266	square miles.

From the rough map resulting from my reconnoisance, I am inclined to believe that this is much less than the true area of the field, which I estimated at somewhat over three hundred and sixty square miles; as follows:

Karatsu peninsula (including Taku District?)	140	square miles.
Hiado " (including Imabuku District)	180	" "
Southern " (including Matsushima)	40 (?)	" "
Total estimated area	360	square miles.

With regard to this southern peninsula, I am informed that sandstones, etc., similar to the coal-bearing rocks, are continuous along the west coast nearly to Nagasaki bay. If these are coal measures, the peninsula has an area of coal-bearing rocks several times larger than my estimate. No coal has yet, to my knowledge, been discovered on this peninsula; though large quantities are brought from Matsushima, a large island off the coast.

The coal beds of the Karatsu field are all very thin. In the lower measures there are perhaps ten seams, from one foot or less up to one and eight-tenths feet in thickness. In the upper measures there are, at least, two or three workable seams; the best reported at four feet. The thickest that I saw was but two and nine-tenths feet.

Notwithstanding the thinness of the coal beds, this field is vigorously worked, producing in 1874 over one hundred and seventy-six thousand tons of coal, or about forty-five per cent. of the total product of the Empire. Nearly all of this coal was obtained from beds between one and two feet in thickness; while in very favorable situations, seams only six-tenths of a foot thick have been worked with profit.

The coal of the Karatsu field is mainly a non-caking dry coal with a long flame, or a caking coal with a short flame. The quantity of ash is sometimes small, but usually ten per cent. or more: and of water, not often more than three per cent. Karatsu coal is largely used by Japanese steamers and for manufacturing purposes, being carried by junks to all parts of the country. Its principal consumption, however, is in salt boiling, being used for the final evaporation of the brine from sea-water, previously concentrated by the sun and wind.

Miike Coal Field.—This coal field is situated about forty miles northeast of Nagasaki, for the most part in the ken of Fukuoka, near the boundary of Kumamoto ken, and on the coast of the Gulf of Shimabara. The coal rocks are exposed in a belt parallel to the coast, with a width of one or two miles, covering an area of nearly twenty-five square miles. They have a general dip of about five feet in a hundred, toward the sea; but in some places they are said to be locally folded and faulted. Near the coast they are overlaid by more recent clay rocks, but taking into account the gentle dip of the coal strata, it seems probable that they will be found beneath these clay rocks at a depth of not more than one thousand feet, over an additional area of twenty or thirty square miles, making the total available area of this field perhaps fifty square miles.

So far but two seams of coal have been worked; the upper bed six to eight feet thick, and the lower, separated from this by twenty feet of rock, four to five feet in thickness. A third bed is reported to occur below these, but it has not yet been mined.

This coal field is actively worked by the Government Mining Office, under Japanese superintendence, and produces annually sixty to seventy thousand tons of coal. The coal is a fat, caking, blacksmith's coal, resembling that of Takashima. It is used principally for salt-boiling, though a small proportion of the product is brought to Nagasaki and other ports, where it is gradually finding favor as a steam coal. It is also used, to a limited extent, for the manufacture of coke; the different foundries of Nagasaki, Kobe, and Yokohama creating a small demand for this fuel. It has also been used as a gas coal in Yokohama and Tokio, though to what extent I am unable to say.

The Miike coal is somewhat inferior in quality to that of Takashima, containing a larger percentage of ash. From my own assay, of a small hand specimen, this would seem to reach seventeen per cent., but it may be that my sample was unusually bad. The water, by the same assay, was only one-half of one per cent. The coal of the upper bed is said to be the best.

The Miike coal field labors under a serious disadvantage in that only vessels of very light draught can approach the shore, the water being very shallow, and mud-flats of a mile or more in width appearing at low tide. The coal must, therefore, be taken in these small vessels, eighty or ninety miles by water, to Nagasaki for transhipment, this being the nearest port.

Amakusa Anthracite Fields.—On the west coast of the island of Amakusa are two small coal fields, each but a few square miles in area. The coal is an anthracite; sometimes even graphitic. The beds are but two to three feet thick, and two seams only are recognized, though there are probably more.

The coal is mined in many places, but only on a small scale. The whole product is used in the neighboring provinces for lime-burning.

Graphite.—In Kagoshima ken near the southern extremity of the island of Kiushiu, a small deposit of graphite has recently been discovered. The graphite occurs in irregular masses, scattered through the fissured, broken, and partially metamorphosed rocks forming the foot wall of a volcanic dyke. Similar well-defined dykes, one hundred to one hundred and twenty feet in thickness, everywhere penetrate the shales and sandstones of this vicinity.

Deposits of coal, of a very inferior quality, are said to occur within a few miles of this place; and, from their reported direction, are probably in the same series of sandstones and shales. It seems, therefore, not unlikely that this graphite may prove to be the result of a local alteration of one of these beds of coal, and that further development of the mine may lead to the discovery of this bed.

The graphite is of very good quality, as will appear from the following analyses made by Mr. GOWLAND of the Imperial Mint:

	I.	II.
Carbon	88·09	89·22
Ash (pale grey)	11·01	10·78
	99·10 (?)	100·00

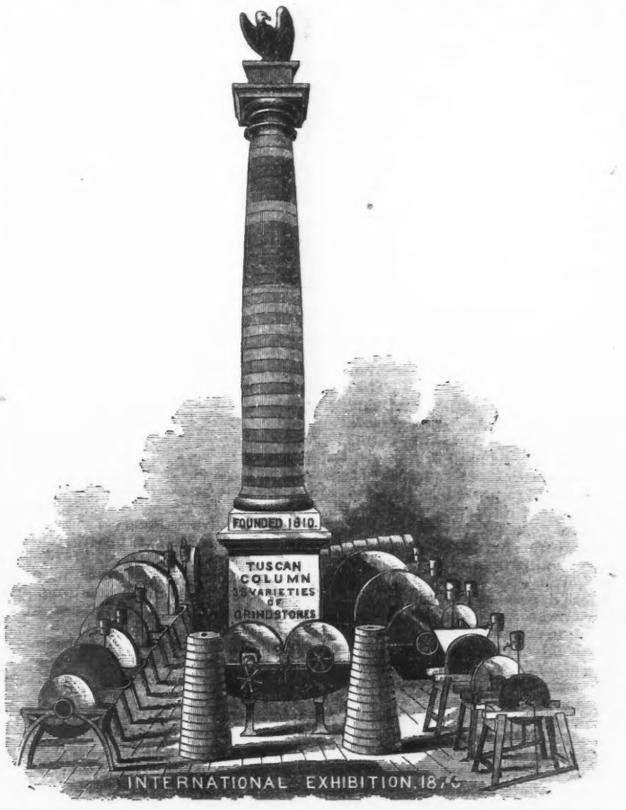
This graphite has not yet been utilized, though experimental crucibles have been made from it which are said to work well.

TO BE CONTINUED.

GRINDSTONES AT THE CENTENNIAL.

THE principal exhibit from abroad was shown by Sweden. It consisted of four stones from 30 to 48 inches diameter, of a fine blue grit, not unlike the Nova Scotia stones; a lot of small grindstones, whet-stones and currier scouring-stones, and three grindstones with very heavy cast-iron fixtures, with a circular base to be screwed to the floor. A display from Nova Scotia consisted of three grindstones and fixtures, scythe-stones, etc.

The largest display in the United States Department was shown by J. E. MITCHELL, of Philadelphia. It consisted, as shown in the accompanying cut, of a very handsome Tuscan column, 26 feet high, and formed of 38 varieties of



grindstones from all parts of the world, such as are used in the mechanic arts; 15 grindstones (with fixtures) ready for use, showing the various modes of hanging them; and a collection of grindstones from 1,000 to 4,000 pounds, each illustrating the various grits used in the manufacture of edge tools, and for grinding saws, files, and the iron work of locomotives. For this latter purpose a large grindstone is now kept running in all the locomotive works, and in the repair shops of the principal railroads.

Samples were also shown of bead-stones, for grinding the dies in nail works. Great care is necessary in the selection of stones for this purpose, as they are always used dry or without water, and the grit selected must be sufficiently stiff not to crush down when in use, and yet not so hard as to glaze, which would result in heating and drawing the temper of the die. This firm have made a specialty of this branch of their business, having supplied our principal nail works for 40 years past. A pamphlet giving a description of the various kinds of grindstones in common use, with the best modes of hanging and keeping them in good order, has been published, and can be obtained by those interested by addressing J. E. MITCHELL, York Avenue, Philadelphia.

THE NOVA SCOTIA COAL TRADE.—The St. John's (N. B.) *Telegraph*, under date of Dec. 4, says: "For the greater part of this week there was no coal to be got at any wharf in the city except from the stores laid up for winter. Vessels ought to be here in considerable numbers, but contrary winds have obstructed them. The result is that coal is not so cheap as it ought to be in the capital of a coal country. Indeed, it is hardly right that Halifax should pay so high for coal from year to year, and that sometimes the supply actually falls short of the demand. The trade in general is very dull—worse even than it was last year. Some of the Cape Breton mines that were operated last winter will be closed down this winter, of necessity, there being no adequate demand for the coal that could be raised. Thus there will be inevitable want and distress in some sections of Cape Breton this winter. Happily, the crops in the Island have been very good, and the farmers being generous and hospitable there will be no starvation. There is great longing for absolute free trade in coal with the United States, or, as the next best thing, a retaliatory tariff. The only thing now certain is that the coal-mining interests are sadly depressed—that companies and individuals have lost heavily and are losing still—and that the whole province suffers more or less through the prevalent depression in this important industry."

THE DIVINING ROD.

TO THE EDITOR: SIR—I was much interested in that part of the lecture on mining by Prof. SMYTH, of the Royal School of Mines, relating to the divining rod for finding mineral veins, or subterranean springs of water, and published in your number of September 9.

That a paper has been read on the subject before the British Association, and the belief in its efficacy in proper hands, by Prof. SMYTH himself, shows that the strange power of attraction manifested is securing the attention it merits. Because a reason cannot be given for an alleged phenomenon is no cause why it should not exist, or, if existing, why it should not be inquired into. Most of the discoveries of science would not have been made had inexplicable phenomena been set aside as being unworthy of attention because no reason could be given for them at the time when first observed.

I have heard of the Cornish witch hazle from my childhood, but always thought it a fable, till one day in the woods of Pennsylvania one of my chainmen mentioned that springs could be found by means of a forked switch of any kind of fresh cut hardwood. I laughed at the idea, but he insisted; so I made a trial by standing astride a small brook, one branch of the fork in each hand, the stem standing outward horizontally. What was my amazement to find that the latter bent slowly down with a force I was entirely unable to counteract. The experiment was quite sufficient to make me credit all that had been asserted of the divining rod, though I have never tried it over mineral veins. Prof. SMYTH says that all persons are not able to produce the effect, which may very well be, just as spiritualists pretend that some persons are naturally more adapted to act as mediums than others, and may not the power exerted by them on chairs and tables have some connection with the force manifested by means of the divining rod?

Again, it is a well established fact that the existence of forests increases the average rainfall of a country. This has been attributed to the stratum of cool air existing under the foliage which condenses the clouds, as well as to other causes. May not this attraction of growing timber for water have some influence in drawing to itself the moisture of the atmosphere? unless, indeed, the force which makes the twig bend be caused by the vital power of the person holding it. These, however, are the very questions to be solved should a competent person take them up.

I am glad to see that so distinguished a man as Prof. SMYTH has the courage to assert his belief in what it is the fashion to consider as an exploded fallacy by persons who have never tried it or made proper inquiries regarding it.

SAN FRANCISCO. D. COGHLAN.

ROCK DRILLS AT THE PHILADELPHIA EXHIBITION.

Special Report of the Engineering and Mining Journal.

A VERY marked feature of the display of rock drills at the Exhibition is the great number of improvements and modifications in details which have recently been made in them. The limited application of power drills to the working of large tunnels did not at first call for a machine having a wide range of adaptability. The great advantage of using power drills when compared with those operated by hand, soon created a demand for machines which could not only be used in tunnels, but also in open work and in shaft sinking.

The mechanical construction of the working parts of the drills has also been modified and improved, so that long runs without breakage or necessary repairs are now rather the rule than the exception. In those drills which work by percussion, the tendency seems to be to construct them so that all or nearly all working parts are concealed from view, as in the case of certain kinds of direct acting pumps.

The advantages which are gained by this concealment of the working parts are those due to the avoidance of breakages or derangement in handling, and also to protection from the effect of dust or other foreign substances when working in confined places.

These advantages are, however, to a considerable extent counterbalanced by the difficulty of keeping a close watch on the working parts, which may become loosened or unduly worn without attracting attention until a serious break-down results.

In consequence of these different considerations, several of the rock-drill companies continue to make the older forms of drills with outside mechanism, as well as those of recent device. All the percussion drills now made consist essentially of the three general parts: the cage in which slides the second part, the cylinder, and the piston which operates the drill rod. The early attempts which were made of having the piston slide upon the rod carrying the drill have now been entirely abandoned, and all machines now used are driven by a solid piston, the piston rod of which is rigidly fastened to both the piston and the drill. The valves used are, with one exception, moved by tappets or lugs, which are struck or reversed by the solid pistons, or by sleeves which surround them. To get as full an effect as possible from the power used, the blows struck by the drills are cushioned so slightly by lap of the valves, that it frequently happens that the pistons strike against the lower cylinder heads, and sometimes the pressure of air used is so suddenly increased by incautious opening of the valves that the safety of the upper cylinder heads are endangered from the same cause. Special cushioning devices for obviating this difficulty are now generally provided in all the machines made.

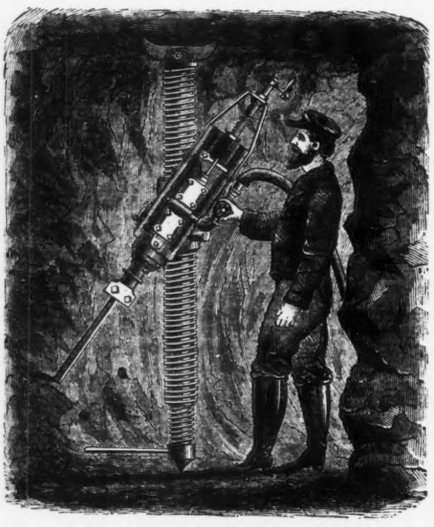
The relative advantages of automatic or hand-feeding drills has been pretty thoroughly experimented on, with results which show that when the mechanism of the automatic feed works without rapidly breaking down, more work can be done with the automatic drills than with those which are hand fed.

The diamond drills, which at first were used almost exclusively for deep well boring or prospecting, are now made in small sizes for open quarry and tunnel work. The practical difficulty of keeping long bore holes straight, which in the case of deep shaft-sinking has proved a very serious obstacle to successful working, is now to some extent obviated by the use of spiral grooved guides, having diamonds set in them at considerable intervals to prevent the wear of the steel. An important change has been made in the feeding arrangements used on these drills. The very ingenious arrangement of differential screens which was first used to feed the drills, has been replaced in great part by an arrangement of hydraulic cylinders which produce a constant pressure on the drill rods. The bits which cut an annular ring in the rock seem to have come into almost exclusive favor, to the exclusion even of the solid bits in boring small holes. The steady pressure used on the bits allows the working machinery to be constructed much more lightly than in the case of the percussion drills.

THE BURLEIGH DRILL.

This is the first power drill which was ever made a success in this country. As long ago as 1848, attempts were made to drill by steam, in which year J. J. COUCH and J. W. FOWLE, of Boston, experimented on a drill having a hollow piston, through which the drill rod passed. The experiments were not successful, and Mr. FOWLE came to the conclusion that the only way in which success could be attained would be by using a solid piston with the drill holder directly attached to it. The experiments which were tried were not, however, successful, and up to 1861 no further progress was made in using this principle. Then the Sommelier drill began to be used on the Mt. Cenis Tunnel. Several attempts were then made at the Hoosac Tunnel to carry on machine drilling, one form of machine with hollow piston being partially designed by Mr. BURLEIGH. These attempts were also unsuccessful, owing to constant breakages which took place.

Mr. BURLEIGH then abandoned the hollow piston, and turned his attention to the construction of a drill on the FOWLE or solid piston system. His efforts were then successful, and the drill stood sufficient service without needing repairs to make its use advantageous both in cost and rapidity of working when compared with hand labor. The form of drill made for service at the Hoosac Tunnel is still adhered to by the Burleigh Company, although many machines of a different pattern are now made. The Hoosac Tunnel drill is provided with an automatic feed, which partially does away with the labor of one man in operating each machine. The cage in which the cylinder of the drill slides, has a gallows frame made at the back end of it, in which a screw rod, held to the gallows frame by collars, revolves. The screw passes into the cylinder through a feed nut, the piston in the cylinder being bored out so as not to strike the cylinder as it oscillates. The self-feeding arrangement consists of a pawl which works in the ratchet nut before mentioned, which is operated by the striking of the piston on its up stroke against a tappet lever.



The most recent form of drill which the Burleigh Company now make is unprovided with the automatic feed arrangement, in order to simplify the machine as much as possible, and by so doing avoiding considerable repairs, which are always necessary in the self-feeding drills.

This new drill has a solid steel plunger-piston which is continued out at the back end into a piston rod of smaller diameter, and which has a long bearing surface. This back piston rod passes through a ratchet nut which is only allowed to run in one direction by a pawl. Four spiral guides are cut in this piston rod where it passes through the nut splines, which work in the grooves. The motion of the piston when thrown back causes it to partially revolve, and carry at the same time the drill with it. On the forward stroke the natural friction of the piston causes it to turn the ratchet nut through the influence of the grooves in the piston rod pressing against the splines. The valve for admitting the air to the cylinder is of the ordinary slide form, and is bolted to the top side of the cylinder. It is moved by two tappets, each of which have two short arms, one of which presses against the end of the slide valve while the other projects enough into the cylinder to be struck by the solid end of the piston as it finishes its stroke. In order to get the whole effective area of the piston on its down stroke a suitable port carries the steam to the end of the back piston rod. A cushion packing is put in this end of the cylinder to prevent any breakage in case the piston is lifted with too much force. The lower end of the cylinder is fitted with a strong steel gland which is held in place by bolts which pass from one end of the cylinder to the other, lugs cast on the cylinder holding them in place. So strong is this fitting made that the piston can be driven against this head repeatedly without suffering any injury. Ordinary spring packing rings are used in the pistons to keep them steam tight. The hand-feeding arrangement consists of a screw working in a gallows frame, which is attached to the upper portion of the cage, the end of the screw being held in a lug on the lower side of the cylinder. It is found in practice that the jar produced by the striking of the drill lowers the cylinder enough to make the feed motion a practically automatic one. This, of course, can only occur when the drill is working vertically, or nearly vertically, downward. The drills, which are displayed in Machinery Hall by the Burleigh Company, are attached to a variety of tripods and columns to show the methods of holding them. The workmanship of the drills and their appendages is of the very best character, being made at the Putnam Machine Works, where all the American Burleigh drills are constructed. The bits used are of the X pattern, which are found to drill better and more economically than any other form. A very interesting thing in the exhibit of the Burleigh Company is a model of the country through which the Sutro tunnel is being driven, and where twelve of the Burleigh 3½-inch cylinder drills are being used Specimens of the various rocks which have already been cut through are also shown. It is interesting to note that the progress made in this tunnel since power drills have been used has been as much as 417 feet a month at one heading.

PHILADELPHIA, October 31.

PREPARATION OF PLATINUM BLACK WITH GLYCERINE.—If platinum chloride is heated with glycerine to the boiling point the liquor becomes dark red from the formation of chloride, a black precipitate of finely divided chloride following shortly after. On washing and drying the precipitate has a greyish hue. This platinum black has little value, but if caustic potash is added in the preparation, an excellent product is the result. The best method of preparation is to heat together 15 cubic centimetres glycerine (25° to 27° Baumé), and 10 cc. solution of potash (1·80 sp. gr.), and drop in 3 to 5 cc. solution of platinum chloride as soon as ebullition begins. The strength of the latter solution is that commonly used as a reagent. The operationoccupies only a few minutes. The black precipitate is first washed with dilute hydrochloric acid, and finally with pure water.

ANNUAL REPORT OF THE DIRECTOR OF THE MINT.

WASHINGTON, Dec. 5. 1876.

The Director of the Mint, in his annual report of the operations of the United States Mints and Assay offices, for the year ending the 1st instant, says:

During the year, the amount of gold deposited for coinage and bars was $41,943,285 41, and silver deposits and purchases, $24,574,551 81.

The coinage of gold was	$38,178,962
Coinage of silver	19,126,502
Minor coins	260,350
Total	$47 565,815

This was an increase over the coinage of the preceding year of $4,624,997 in gold, and $9,056,134 in silver. Since the passage of the appropriation bills providing for the support of the mints, these institutions have been run to their fullest capacity in manufacturing silver coin for the redemption of fractional currency, in addition to gold and trade dollar coinage.

SILVER COINING.—During the months of August and September of the current year the coinage of silver amounted to $4 398,210 in subsidiary coin and $1 082,200 in trade dollars, being at the rate of $32,882,460 per annum. This is by far the heaviest silver coinage for any corresponding period of time in the history of the mint. The largest silver coinage in any year preceding the establishment of the Mint Bureau was in 1853, immediately after the change of standard, and amounted to $9,077,571.

Should any laws be enacted at the approaching session of Congress contemplating the issue of silver in any other mode than the redemption of fractional currency and in exchange for gold coin, the necessity of providing for the coining of silver at the New Orleans Mint is respectfully submitted. That institution could be put in condition for such coinage in about three months and at an expense of about $75,000. In addition to the regular coinage operations there were manufactured at the Philadelphia Mint 1,864 medals and 1,843 dies.

COINS FOR VENEZUELA.—In accordance with a request made by the Venezuelan Government, and in conformity with law, preparations have been made at the Philadelphia Mint to strike for that government the sum of $150,000 in minor coins of copper and nickel alloy. During the year preparations have been made for fitting up and opening the assay office at Helena, Montana, for smelting and assaying bullion, and also the Mint at New Orleans as an assay office for the same purposes.

PRODUCTION OF GOLD AND SILVER.—From the most authentic sources of information which could be procured it has been ascertained that the domestic production of gold and silver for the fiscal year was about $85,250,000, of which amount $46,750,000 were gold, and $38,500,000 silver.

LEGAL TENDER SILVER DOLLARS.—The Director devotes the principal part of his report to a review of the several propositions for the coinage of legal tender silver dollars under double standard. He says that the decline in the value of silver and the approach of the time fixed by law for specie resumption has led to various propositions for the restoration of the silver dollar of 412¼ grains, with unrestricted coinage and unlimited legal tender, and that these propositions, if adopted, would make the relative value of gold to silver in legal tender coinage as 1 to 16, very nearly. A dollar of 400 8-100 grains, which would correspond exactly to the ratio of 1 to 16, and one to represent the ratio of 1 to 15½, have also been proposed.

The Director recommends not only that the legal tender of silver coins be increased to $10, but that on and after the resumption of specie payments these coins be made receivable by law at the Treasury of the United States and its principal offices in payment of all dues except duties on customs. He also recommends that the trade dollar be coined exclusively on the Government's account, and be made a legal tender to the amount of $50 or $100. It is already a valuable trade coin, and if made a legal tender to the amount stated would enable banks better to stock themselves with specie, and in other ways prove a useful addition to the circulation. The special value which this coin possesses for export to China would operate to prevent a redundancy, and any undue withdrawal could be replaced by coinage at the mints.

SILVER COIN IN GREAT BRITAIN.—The silver coins in circulations in Great Britain are stated by competent authority to be £20,000,000, equal to nearly $100,000,000. The Director thinks that if the Silver Coinage Laws should be amended, as suggested, an amount fully equal that sum could be advantageously employed in the ordinary money transactions of the people of the United States. Further than this, the Director says it is apparent we cannot go, unless we are prepared to use silver as the money standard and deprive the country for an indefinite period of the unquestionable advantages of a gold currency. Whether in such a case silver coins would actually circulate more extensively than under the present system, amended as recommended, may well be doubted. Silver being less convenient to handle and transport than gold, paper money would have to be employed to a much larger extent than under a gold standard with silver subordinate, and used in all transactions for which it is suitable. For resumption on a gold basis the country has already a stock of that metal, amounting to about $150,000,000, which is half the amount required for that purpose, and the annual domestic production of that metal exceeds that of silver. Of the latter metal there is not probably more than $3,000,000 in the country, exclusive of change money, plate and other manufactured articles. We should not have any more difficulty in retaining our gold product than that of silver, and either or both will be exported whenever there are foreign balances which cannot be adjusted in some other way. If a double standard is to be established, on a basis which will practically make silver the actual standard, the question arises as to the source from whence the necessary supply of silver is to be derived.

The annual silver product of our mines, even at the increased rate of last year's production, and which it is probable will not be permanently maintained, would be quite insufficient for the purpose.

UNDERGROUND TEMPERATURE.—The last report of the Underground Temperature Committee of the British Association states that the subject chiefly under consideration was, the presence of water in bores, and the means to prevent it. A great many experiments had been made, but they had all been rejected. The committee had, however, obtained some which were the best that had yet been got. There was an exceedingly deep bore at Spernberg, about twenty miles from Berlin; it was 4.052 Rhenish feet, or 4,172 English feet deep, and the bore was almost entirely through rock salt, and full of water, and the temperature at the surface was 7·2 deg. Reaumur; at 700 feet the temperature was 17·2; at 3,390 feet, the deepest point at which reliable observations were obtained, the temperature was 37·2, and that gave 1 deg. Fah. to 50 Rhenish feet. These observations showed that there was a decided decrease of the rate of increase as they went deeper. The next thing the committee had directed their attention to was flooding, and in that the most careful observations had been made to ascertain the effect of its presence, and whether flooding was necessary. The first experiment was made to ascertain whether the water at the bottom of the bore had the normal temperature of the surrounding rock, because if the water at the bottom did not possess that qualification, the water in other parts would not. The way in which it was tested was that when the bore had gone to a certain depth an advance bore was made of smaller diameter, and into that advance bore a thermometer was let down, and the bore then plugged at the place where it communicated with the big bore. The thermometer on being taken out gave a temperature of something more than 36 deg., and the same thermometer let down without the bore being plugged gave a reading of 33 deg. Reaumur. Another thermometer of a different construction gave readings similar to those of the other. The committee had under consideration the obtaining of a plug which would effectually separate the water of the bore below from that above, and at the same time be easy to let down and draw up. Great difficulty had been experienced in reference to that point, and that would now be the aim of the committee to secure such an appliance in order to get correct observations. Additional experiments had been made at a place called Swinderby, near Lincoln, 2,000 feet deep, which he understood was the deepest bore in the east of England. At that depth the temperature was found to be 79 deg. Fah.; deducting from that the temperature of the surface, 50 deg., gave a difference of 29 deg. Another observation at 1,950 feet gave a temperature of 78 deg. In addition to these, Mr. SYMONS had taken observations in a well at Kentish Town for the purpose of determining whether at a given depth of—say—1,000 feet, there was any change of temperature, but as the wire by which the thermometer had been let down had varied in length, there was really no reliable result obtained. Favorable observations had also been taken at Angers, in the north of France.

FURNACE NOTES.

The Siemens Furnace, at the works of PARK, BROTHER & Co., Pittsburgh, Pa., is heated up and has commenced to turn out steel. It is said to be the largest furnace of the kind in the country.

The Pennsylvania Iron Works, at Danville, Pa., which started up recently, with good prospects of running all winter, are now idle again.

The Marden Creek, Pa., Iron Works were recently sold for the sum of $21,000. The charcoal furnace connected with the property, situated at Leuhartsville, 19 miles north of Reading, will probably be put in blast the first of the year.

Pennsylvania Steel Works.—The blooming mill at these works has resumed operations, with a large reduction of hands, in consequence of the new labor-saving hydraulic apparatus to be used hereafter.

Keystone Furnace.—The furnace property, engine-house, dwellings, farms mines, quarries, etc., of the Keystone Iron Company, situated near Chain Dam, Pa., were sold at sheriff's sale on the 14th ult. to HENRY FULMER, of Easton, for $77,000. Its original cost was over $200,000.

Tamaqua (Pa.) Rolling Mill Co.—We note the statement that the rolling mill at this place has received orders from the South for enough hoop iron to keep it running until April next.

Lehigh Valley Iron Co.—The No. 1 furnace of this company, located at Coplay, Pa., was relighted on the 4th ultimo.

Phœnixville (Pa.) Iron Co.—It is rumored that a portion of the new mill of this company will be turned into a nail mill and the remainder into a wire mill.

The Pennsylvania Iron Works at Danville have been started, with good prospects of running all winter. They have lighted up sixteen puddling furnaces, and started the rail mill.

The Bessemer Steel Works of the Cambria Iron Company, at Johnstown, Pa., in the week ending November 18, made 1,706 tons of ingots. The largest 24 hours work was on the 17th, when 68 heats were made.

The Bethlehem Iron Company's Steel Works, at Bethlehem, Pa., are full of work. The iron rail mill and the bar mill are moderately busy.

Schuylkill Iron Co.—The Reading Railroad Company recently became the purchaser of this property at sheriff's sale.

Glendon (Pa.) Iron Co. It is stated that this company has given orders to the ore miners in Williams Township to go to work immediately. This order gives evidence that in a short time some of the Glendon furnaces will be blown in.

Allentown (Pa.) Rolling Mill Co.—Work has been resumed by this company. This will put one hundred and fifty men at work.

The Westerman Furnace, of Sharon, Pa., recently made 273 tons of good mill iron in one week. The three last days of the week it averaged forty-four tons a day, which places this furnace ahead of anything in the valley.

The Lackawanna Iron Works, the predecessors of the Lackawanna Iron and Coal Company, were established in 1840, and carried on a successful business for many years, which in 1873 was enlarged by the starting of an extensive Bessemer steel plant. The works as now running are by far the largest of the kind in the United States, having a productive capacity annually of 120,000 tons of iron and steel rails, and 90,000 tons of forge and foundry pig iron. They manufacture the highest grades of merchant bar iron, car axles, etc. The great strength and purity of their products are in a great measure due to the surpassing richness and purity of their ores, which they mine for themselves at their celebrated mines in Morris and Sussex Counties, N. J., and at Crown Point, N. Y. Their Bessemer steel does not contain over from four to six one hundredths of one per cent of phosphorus, and is suitable for making crucible steel.

The Cleveland (Ohio) Iron Works are running full time on rails and bar iron. In the furnace they are making from fifty to sixty tons of pig iron daily. They employ nearly five hundred men.

The Lake Shore Rail Mill, at Cleveland Ohio, is running double turn still, making 85 tons of finished rails per day. Upward of 300 men are employed.

Girard (Ohio) Rolling Mill Co.—The property of this company, located in Trumbull County, will be sold to the highest bidder on the 9th of December.

The Norton (Kentucky) Iron Works are shipping 2 500 tons of (mostly) blue limestone ore from Wurtland to Ashland. Three years ago this ore cost, delivered at Wurtland, about $5 per ton, to which 50 cents had to be added for transportation to Ashland. At present, the very same grade of iron ore can be delivered for $2.75 or $3 per ton.

The Vigo Iron Company, Terre Haute, Ind., manufacturers of pig iron, after a rest of nine months, will soon start up their furnaces. The works are being extensively repaired and improved.

The Wabash Iron Company, Terre Haute, Ind., are running on three-fourths time on stock, not much of their iron being sold on account of the low prices offered by buyers.

The Richmond Iron Company's Furnace, at Van Duesenville, Mass., will soon close, after a blast of over a year, with a short rest during low water. The three furnaces of this company will then be idle with no immediate prospects of starting up, as they have something like 10,000 tons of iron piled up.

The Laramie Iron Works, Wyoming, are turning out sixty tons of rails every day. The Union Pacific Railroad Company has decided to at once add a merchant iron rolling mill to its works. Work has been commenced and it will be pushed with utmost expedition. It is to be a first-class mill and of large capacity, and intended to furnish merchant iron of all kinds, sizes and qualties for this western region.

Boonton, N. J., Iron Works.—There are no signs of these works starting up this winter, and everything looks dark in the place. It is stated that some of the former employees are nearly on the verge of starvation and go begging from house to house.

Pilot Knob (Mo.) Iron Co.—For several years this company has had about 8,000 tons of pig iron lying at its works, awaiting a rise in the market. The company suspended operations about two years ago, owing to the decrease in the price of iron, and their inability to manufacture at a profit. This year the assessor for Iron County assessed the 8,000 tons of iron above referred to. The company contested his right to assess it, and the case was taken into court. After a hearing, Judge DINNING decided in favor of the County, and we understand that the company will appeal to the Supreme Court.

The Vulcan Iron Works, at St Louis, Mo., are turning out 200 tons of steel rails and 150 tons of iron per day. It has a heavy order for plate iron for rivetted pipes, for the San Francisco Water Works.

The Katahdin Iron Works, O. W. DAVIS manager, about eighteen miles from the Milo Station of the Bangor and Piscataquis Railroad, Maine, are in active operation, giving employment to a large number of men. The old company has just been reorganized under the general law, with a capital of $100,000. The ore is a hydrate brown hematite of excellent quality, and yields over fifty per cent. The furnaces were built some thirty-three years ago.

Albany and Rensselaer Steel Works, Troy, N. Y.—Notice has been posted at these works informing its employees that the works will close December 1st for an indefinite period.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Dec. 2.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co.	34,360	1,862,143	57,260	2,837,488
D. L. and W. RR. Co.	63,897	1,785,356	51,543	2,792,509
Penn. Coal Co	26,766	1,011,951	26,410	1,269,864
L. V. RR. Co	†36,192	867,942	†35,026	874,627
P. and N. Y. RR. Co.	†1,967	23,226	†1,303	85,622
C. RR. of N. J	33,536	1,258,595	45,868	1,367,078
Penn. Canal	3,551	407,522	1,767	299,267
	200,269	7,216,735	219,177	9,526,455
Lehigh Region.				
L. V. RR. Co	†141,740	2,516,576	†131,512	2,046,479
C. RR. of N. J	21,869	1,295,597	35,860	744,836
D. H. and W. B. RR.	....	40,438	1,210	65,252
	163,109	3,952,611	168,582	2,856,567
Schuylkill Region.				
P. and R. R. RR. Co.	134 273	4,596,805	133,490	4,539,574
Shamokin & Lykens Va.	†37,184	889,975	†43,907	1,151,275
	171,457	5,486,780	177,397	5,690,849
Sullivan Region.				
Sul. and Erie RR. Co.	†603	30,051	†2,135	11,849
Total	535,438	16,686,177	567,291	18,085,720
Increase	—	—	—	—
Decrease	53	1,399.543	—	—

* Year beginning January 1st.
† Two weeks ending Dec. 2.

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 476,945 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR. report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	5,424	286,866	188,903
" " South Amboy	10,262	411,806	253,470
Shipments at Coal Port (Trenton)	6,342	278,716	184,836
" South Amboy	7,968	463,008	318,404

Perth Amboy business :	Tons.
Received for the week	15,543
Shipped for the week	10,855
On hand Dec. 2	60,688

Receipts of Coal at Boston, for the week ending Dec. 2, and years from Sept. 1, 1875 and 1876.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	900	11,087	39,531
Philadelphia	24,083	233,000	266,261
Baltimore	1,940	39,341	47,086
Other places	3,124	82,292	108,475
Great Britain	200	1,673	704
Nova Scotia	495	12,853	10,922

Coal Shipped at Pictou, N. S., for week ending Nov.

25 1876	1,683 tons.
Previously exported, since Jan. 1	167,642 "
Total to date	169,325

The Production of Bituminous Coal for the week ending Dec. 2, was as follows :

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week, Tons.	Year, Tons.
Tons of 2,240 lb.	39,832	1,707,186
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb.	†18,321	326,273
Broad Top Region, Pa.		
Huntingdon and Broad Top RR.	3,707	148,114
*East Broad Top	1,421	61,015
Clearfield Region, Pa.		
*Snow Shoe	805	46,122
*Tyrone and Clearfield	29,837	1,056,633
Allegheny Region, Pa.		
*Pennsylvania RR.	5,681	187,532
Pittsburgh Region, Pa.		
*West Penn. RR	3,881	180,420
*Southwest Penn. RR	1,002	51,588
*Penn. & Westmoreland gas coal, Pa. RR.	25,226	781,770
*Pennsylvania RR.	5,180	273,298

* For the week ending Nov. 21.
† Two weeks ending Dec. 2.

The Production of Coke for the week ending Nov. 21.

Tons of 2000 lb.	Week.	Year.
West Penn. RR.	714	46,550
Southwest Penn. RR.	10,633	473,327
Penn. & Westmoreland Region, Penn. RR.	1,403	151,486
Pittsburgh, Penn. RR.	2,399	141,361
Total	15,149	712,724

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Dec. 8, 1876.

Anthracite.

A WORSE condition of affairs than that now ruling has never existed in the coal trade of this market. The demand has almost ceased, while prices are lower than ever before at private sale. At the last auction sales the Delaware, Lackawanna and Western Railroad Company secured an average price of $3.27 for chestnut coal, and $3.58 for stove, and the Pennsylvania Coal Company, $3.58 for chestnut, and $3.29 for stove. At the present time there is plenty of stove coal offering at $3.50, and chestnut at $3.25, while as low as $3.20 has been mentioned, and even these prices are weak. In the face of all this it is generally believed, although not officially announced, that two auction sales will take place during this month. Should the same quantity of coal be offered at auction during this month as was offered in November, there can hardly be a doubt that we shall see prices so low as to discourage all having any connection with the trade. In the face of the late action of some of the large companies in reducing their retail prices at yards to $4.20 for stove, and $3.90 for chestnut, egg and grate, it becomes necessary that the retail dealers shall procure their coal at very low figures, and then they can hardly feel secure, anticipating that the producing companies may still further reduce their prices.

Production continues in proportions entirely too great for the requirements of the market; the proposed reduction in wages has not been made, nor is it known just when it will be; prices continue to decline, and there appears to be a reckless inclination to meet the market and hold established trade, be the consequences what they may; in fact, the whole outlook in the trade is exceedingly discouraging, and we fear that much tribulation awaits it in the near future.

The Philadelphia and Reading Railroad Company shipped for the fiscal year ending Nov. 30, 5,595,207 tons, as against 5,505,455 tons for the year previous, showing a gain of 89,752 tons, although 753,606 tons less than for 1873-4.

The Schuylkill Canal, however, shows a loss of 74,129 tons, the shipments for the fiscal year ending Nov. 30, having been 660,565 tons, as against 734,694 tons for the year previous.

The Lehigh Valley Railroad Company for the fiscal year ending Nov. 30, shows total shipments of anthracite coal 3,951,514 tons, and bituminous coal 35,504 tons, making a total of 3,987,018 tons, as against a total of 3.333,472 tons the year previous or an increase of 653,546 tons, although over 200,000 tons behind 1873-4. The Pennsylvania and New York Railroad for the same period reports shipments of 1,165,953 tons of all kinds of coal, as against 1,083,264 tons for the year previous—an increase of 82,688 for the year just ended and the largest business ever done over the road, being an increase of 149,204 tons over the year ended Nov. 30, 1874.

THE PENNSYLVANIA CANAL.—The shipments of coal from the Wilkes-Barre Basin via this route ceased with the week ending Dec. 2. The total shipments for the year were 407,522 tons, an increase of 108,255 tons over 1875.

Bituminous.

This article is attracting but very little attention. The Cumberland trade by canal is over, while but little can be done from Baltimore in competition with anthracite and Clearfield coals. Our last report of shipments from the Clearfield region is for the week ending Nov. 21, and shows larger than any previous week this year, excepting the week ended Oct. 14, being 29,837 tons, with a total for the year of 1,056,633 tons as against 801,694 tons at the corresponding date of 1875, showing an increase this year of 254,939 tons, which will likely be still further increased before the end of the year, as some of the companies claim to be doing a fair amount of business and have considerable orders on hand.

New York and Philadelphia.

Wholesale Prices of Anthracite Coal f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Rondout	3 00	3 00	3 00	3 00	3 75	3 75
Pittston at Weehawken	3 00	3 00	3 00	3 10	3 60	3 35
Wilkesbarre at Port Johnston	3 00	3 00	3 00	3 00	3 75	3 25
Plymouth, R. A.	....	....	3 00	3 00	3 85	3 35
Susque. Coal Co. at Amboy W.A.	3 00	3 00	3 00	3 00	3 75	3 25
Kingston at Hoboken	3 00	3 00	3 00	3 00	3 75	3 25
Lehigh Coals.						
Old Company at Port Johnston	3 75	....	3 25	3 25	3 75	3 25
Old Company's Room Run "	3 75	....	3 25	3 25	3 75	3 25
Sugar Loaf, Hobok. & Amb. "	3 75	...	3 25	3 25	3 75	3 50
Lehigh Coal Exchange "	3 75	....	3 25	3 23	3 75	3 50
Honey Brook Lehigh	2 75	....	3 25	3 25	3 75	3 25
Beaver Meadow at South Amboy	3 75	....	3 25	3 25	3 75	3 25
Schuylkill Coals at Philadelphia.						
Schuylkill white ash	...	....	....	....	....	....
Schuylkill red ash	...	....	....	....	....	....
Lorberry	....	...	....	....	....	....
Lykens Valley	....	...	....	....	....	....
North Franklin red ash	....	....	....	....	....	....

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	35c.
" " Elizabethport & Port Johnston to N. York.	35c.
" " South Amboy to New York	35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 65
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	6 00	7; 2
" Gas Coal at Richmond.	4 15	5 65
Peytona Cannel W. Va at Richmond.	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75	5 20
Cumberland, at Baltimore	3 65@3 80	5 45
Clearfield f.o.b. Canton, Baltimore	3 40@3 65	5 25

Pennsylvania Semi-Bituminous Coals.

At the mines, per 2,000 lb., 90c. f.o.b, at Greenwich, Phila., for Eastern and Foreign shipments, per 2,240 lb. $3 25@340 for Sound ports, 3 50@3 65, through Delaware and Raritan Canal, for points on Hudson River, $3 80 f.o.b., at South Amboy, N.J., per 2,240 lb., $4 5c@4 70. Discharged, in New York, per 2,240 lb., $5 00@5 25.

Foreign Gas Coals.

	Sterling.	Am. currcy,
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S.	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$3 90	$4 20	$3 90
Lackawanna coal, in yard	3 90	4 20	3 90
Wilkes-Barre, delivered	5 00	5 30	4 60
Lehigh & Locust Mountain, del'd.	5 50	5 50	5 00
Schuylkill Red Ash, del'd	5 25	5 50	4 75

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb.	$18 00
Liverpool House Cannel " " "	.... 18 00
American " " " "	.... 11 00
Cannelton Block, or splint, " " "	.... 10 00
American Orrel " " "	....11@14
Red Bank Cannel " " "	.... 10 00
Cumberland " " "	.... 7 00

Baltimore, Md. Dec. 5, 1876.

Specially Reported by Messrs. E. STABLER & Co.

Navigation by Canal to this city is suspended for the season. (Wyoming, Pennsylvania and Susquehanna, and Tide-water Canals, via Havre-de-Grace.)

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Boston" Vein, and Plymouth White Ash.

In cars at depot.		In cars at depot.	
Lump	$3 85	Egg	$4 10
Steamboat	4 10	Stove	4 60
Broken	4 10	Nut	4 10

Shamokin, red or white ash.

Egg	4 30	Stove	4 60

Lykens Valley, red ash,

Egg and stove	5 35

From wharf or yard, wholesale, 50@75c. additional.
By retail, all kinds and sizes, per 2240 lb. $6 00@7 50

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Boston, Mass. Dec. 2, 1876.

COAL is easy at wholesale, but was yesterday in pretty good demand from the retail yards. The impression is gaining ground that the production will shortly be materially diminished. The stocks in the hands of the companies are believed to be very large.—*Commercial Bulletin.*

Buffalo, N. Y. Dec. 6, 1876.

Specially Reported by LEE & LOOMIS.

Deliv'red at	Elmira. Afloat.	Ithaca. Afloat.	Syracuse Afloat.	Rochester. Afloat	Rochester. ret. del.	Oswego f.o.b.
Grate	$4 20	$3 45	$3 60	$4 30	$5 55	$4 55
Egg	4 20	3 55	3 70	4 40	5 65	4 05
Stove	4 60	4 05	4 20	4 90	6 15	5 15
Nut	4 35	3 80	3 95	4 65	5 90	4 90

Delivered at	Erie. f.o.b.	Buffalo. Afloat.	Buffalo. f.o.b.	Buffalo. ret. del.
Grate	$5 05	$4 55	$5 05	$5 80
Egg	5 15	4 65	5 15	5 90
Stove	5 65	5 15	5 65	6 40
Nut	5 40	4 90	5 40	6 15

Chicago, Ill. Dec. 4, 1876.

Reported br our Special Correspondent.

Lackawanna Stove	$8 00	Erie and Brier Hill	$6 00
" Chestnut	7 75	Wilmington & Ill.	3 50@ 4 25
" Grate & Egg,	7 50	Blossburgh	7 00

Cincinnati, O. Dec. 4, 1876.

Specially Reported by A. BUCHANAN & Co.

	Per ton of 2000 lb. Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	@7c.	—
Pomeroy coal	@5c.	—
Kanawha "	7½c.	—
Ohio River Coal	5½c.	—
Cannel coal, according to quality	@16c.	—

The following are the retail prices delivered

Youghiogheny	10@11c.	—
Pomeroy	9c.	—
Cannel	@22c.	—
Kanawha	10c.	—
Anthracite, per ton	$9 00@9 50	
Coke, at yard	10c.	
Coke, hard and soft, delivered	— @9c.	—

Cleveland, O. Dec. 4, 1876.

Specially reported by Messrs. LAMBIE & BATES.
Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	1 to 10 tons upw'd.
Lacka'a., Wilkesbarre and Pittston egg and grate,	7 00 6 75
" " " stove	7 50 7 25
" " " chestnut	7 25 7 00

Lehigh to be $1 25 per ton higher.
All sales to be strictly cash with order or C. O. D.

Indianapolis, Ind. Dec. 4, 1876.

Specially reported by Messrs. COBB & BRANHAM.
Wholesale on board cars, and retail delivered to consumers.
Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton.
Lehigh, retail	$11 50 per ton.

Louisville, Ky. Dec. 4, 1876.

Specially reported by Messrs. BYRNE & SPEED.
Four months allowed on quotations below.

WHOLESALE.

per bushel		per bushel	
Pittsburg	6½c.	Pine Hill	—
Raymond City	6½c.	Kentucky	7c

RETAIL.

per bushel		per bushel	
Pittsburgh	10c.	Peytona Cannel	18c.
Raymond City	10c.	Buckeye "	
Pine Hill	13c.	City-made Coke	8c.
Kentucky	9c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load			$3 50
Screened Raymond City			2 50
Pine Hill (Kentucky)			2 25
Cannel			4 50
City-made Coke			4 00

Milwaukee, Wis. Dec. 4, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

The coal trade is not as good as might be desired The reduction of prices east compel a decline here. The following are the prices with us for the present :

Retail price per ton of 2000 lb.

Lehigh Lump	$ 8 00	Briar Hill, select	$7 00
Lehigh Prepared	9 00	Blossburgh	7 00
Lackawanna (all sizes)	8 00	Cannel	6 00
Pittston	8 00	Pittsburgh	6 50
Scranton	8 00	Oak Hill	6 00
		Steam coal	4@5 00

New Orleans, La. Dec. 1, 1876.

Specially Reported by Messrs. C. A. MILTENBERGER & Co.

On hand December 1st, 118 boats, 5 barges, and 1 French creek; consumption during November, 31 boats, 7 barges, 2 French creeks of Pittsburg coal, and 2 boats of St. Bernard. No arrivals.

We can report an advance in the wholesale coal market (Pittsburg coal) since our last, with the prospect of a still further advance the current month, owing to the limited stock on hand and the increased demand. We quote:

Pittsburg coal, wholesale, by boat-load, per bbl	30c.
" steamboats, per bbl	40c.
" to manufacturers, per bbl	45c.
" to families	50c.
" shipments, per hhd	$5 00
Anthracite, wholesale, per ton	7.50
" retail, "	11.00
Virginia Cannel, retail, per bbl	1.00
Scotch " "	
Mt. Carbon, wholesale, per bbl	
" " retail, "	
St. Bernard wholesale, per bbl	25c.
" steamboat	30c.
" retail, "	4c@45c.

Pittston, Pa. Dec. 5, 1876.

Pennsylvania Coal Company's Coal in yard, ton of 2000 lb.
Retail.

Lump, Egg and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, fifty cents per ton additional.

Philadelphia, Pa. Dec. 7, 1875.

From our Special Correspondent.

THERE is no particularly new feature in the coal trade here. Orders are not plenty, and but few collieries can continue to run. Some are stopping almost every day. The Coal and Iron Company are reducing their production materially—but not, it is feared, down to what they can dispose of—which compels them to accumulate coal, and thus embarass the trade at the start next spring with stocks. which always operate injuriously at a time when it is most important that the trade should have a fair start. This disregard of plain business principles is caused by attempts to force the trade when it cannot be done, and make a show of tonnage. The prices in the company's retail yards were reduced 25 cents per ton to-day.

There is very little shipping done, and rates of freights continue low for the season, but not sufficiently so to enable this port to compete with New York, except by making ruinous concessions in the price of the coal.

Richmond, Va. Dec. 5, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.
Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 40
Coalburgh Splint	5 70	Clover Hill Coal	3 50
Lewiston "	5 70	James River Bitum	3 30
Kanawha Gas coal	4 90	" " Carbonite,	5 00

San Francisco, Cal.

From the *Commercial Herald*, Dec. 7, 1876.

Imports from Jan. 1st to Nov. 14 :

	tons.		tons.
Anthracite	10,784	Vancouver Island	83,763
Australian	123,363	Rocky Mountain	163
Coos Bay	34,360	Seattle	80,009
Cumberland	12,421	Bellingham Bay	19.635
English	91,294	Chili	3.150
Mt. Diablo 10 mos	93,964		

The market is very sluggish, and it is asserted on 'Change that there are two or more cargoes of steam on the market which cannot be placed at even $7 per ton. It would seem that the *Berkshire's* cargo that was last week reported sold at auction, "as is" for $6.87½, was bid in not sold and is upon the market at a low figure. The spot price of Cumberland ex ship, $14@$15 in bulk, $17 in casks ; Lehigh, $13.50@$15 ; Pittston, $14@ $14.50 for Egg ; Sydney Steam, $7.50 ; Wallsend, $8@ $8.25 ; West Hartley, $8.50@$9 ; Mount Diablo, fine $5.75, coarse $7.75 ; Coos Bay, $9 ; Seattle, $9 ; Bellingham Bay, $8.

St. Louis, Mo. Dec. 4, 1876.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.

			per ton.
Lackawanna	$9 00@10 00	Schuylkill	9 00@10 00
Wilkes-Barre	9 00@10 00	Lehigh	10 00@10 50

BITUMINOUS.

Blossburg	9 00	Big Meadow	3 00
Pittsburg	4 50	Illinois Coals	2 50@3 00
Indiana Block	4 00	Connellsville Coke	2 50

Toledo, Ohio. Dec. 4, 1876.

Specially reported by GOSLINE & BARBOUR.

We quote as follows for retail delivery :

Ton of 2,000 lb.

Lackawanna lump	$6 75	Lehigh lump	$7 75
" egg	6 75	" egg	7 75
" stove	7 00	" stove	8 00
" chestnut	6 75	" chestnut	7 75

Soft Coal.

Hocking lump	4 00	Brier Hill	5 75
" nut	4 00	Blossburg	8 00
Willow Bank lump	4 50	Cumberland	8 00
" " nut	4 00		

Hamilton, Ont. Dec. 4, 1876.

Specially reported by H. BARNARD, Dealer in Coal.

Retail, per ton of 2,000 lb.

Grate	$5 75	Smithing	6 00
Egg	5 75	Bituminous, retail	5 50
Stove	6 00	" steam	4 00
Nut	5 75	Coke	6 75
Lehigh Lump	6 50		

Montreal, Canada. Dec. 4, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

Wholesale per ton of 2240 lb.

Scotch Steam	$4 25	Cape Breton Steam	$3 75
Pictou "	4 25	Newcastle Smiths,	5 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 25	Chestnut	6 25
Stove	6 75		

Rates of Transportation on Anthracite Coal to Tide Ports.

Lehigh and Wyoming Coals.

per ton of 2240 lb.

	From Penn Haven.	From Mauch Chunk.	From Hazleton**	From Upper Lehigh.	From Ashley and Sugar Notch.
To ‡ Newark, N. J. (117 miles), via Central Railroad of New Jersey	1 62	1 48	2 04	1 95	2 18
‡ Mauch Chunk, Pa., via Central Railroad of N. J.	14	...	58	49	72
‡ Phillipsburg, N. J., (46 miles)	60	46	1 00	91	1 14
Elizabethp't, (114 m.) Pt. Johns., Hoboken & South Amboy, N. J., shipping and wharfage 35c. add.	1 26	1 12	1 68	1 59	1 82
High Bridge, N. J.	1 95	1 75	2 43	2 34	2 52
Elizabeth, Cranford, Westfield & Elizabethport, for consumption,	1 89	1 75	2 31	2 22	2 45
Jersey City, N. J., (121 miles) and New York, via L. V. RR.	1 59	1 47	2 01	1 92	2 15
From *Mauch Chunk* to *New York* (121 miles), (towing limits) and Jersey City† via Lehigh Valley RR.					$1 47
From *Mauch Chunk* to *Philadelphia* (93 m.) via L. V. and L. and S. RR. and North Penn. RR					1 25
For way points between *Mauch Chunk* and *Phillipsburg*, on the New Jersey Railroads					1 00
From *Phillipsburg, N. J.* to *Hoboken* (84 m.) for shipment via Delaware. Lackawanna and Western RR., Morris and Essex Division					65
From *Phillipsburg, N. J.*, to *Newark* (75 m.) via Delaware, Lackawanna and Western RR.					1 01

** Rates on line coal from Hazleton are 10c. per ton above these figures.

‡ The cost of unloading is to be added to these rates. No charge less than 40c. per ton will be made for any distance. Tolls from Mauch Chunk to Phillipsburg for way points will be $1 15 per ton.

† Transportation on Coal destined for re-shipment from this point from boat to boat is 20c. less, if discharged upon the wharf 10c. less than the above rate.

The distances in the above table are Computed from *Mauch Chunk*. From *Ashley* to *Mauch Chunk* the distance is 51 miles, and from *upper Lehigh*, 33 miles. From *Hazleton* 24 miles, and from *Penn Haven* 8 miles.

From *Wilkes-Barre* to *Perth Amboy* via the Lehigh Valley Railroad Company, the distance is 161 miles, and from *Mauch Chunk* it amounts to 106 miles.

Geneva, Ithaca and Sayre Railroad.—The rates of transportation on coal from Coxton, Pa., per ton of 2,240 lb., from and after the first of November, will be as follows :

To East Waverly, N. Y.	$1 75
" Ithaca, and for C. Lake RR. (local)	1 64
" " for C. Lake RR., and via Erie Canal (shipment)	1 50
" To Van Etten, for U. I. and E. RR.	1 61
"Geneva (local) for S. P and S. and L. O. S. Railroads, and for N. Y. C. and H. R. RR, except Auburn and Cayuga	2 06
To Geneva, for Buffalo and Towanda	1 85
" " " Rochester and Charlotte	1 99
" " " Auburn and Cayuga	2 50
Total rate to Buffalo	3 17
" " " Rochester	2 75

REGULATIONS.

A charge of fifteen cents per ton will be collected of each consignee on all coal not unloaded within twenty-four hours after its arrival, and an additional charge of ten cents per ton for every twenty-four thereafter; Sundays and legal holidays excepted.

No allowance will be made for coal lost from cars on account of bro ken doors or other defects existing when the cars are loaded.

All freights will be collected weekly, by drafts on shippers, from Coxton to destination.

Freights

Representing the latest actual charters up to Dec. 8, 1876.
Per Ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me.	....	....	....	....
Albany	....	....	....	....
Alexandria	....	....	....	....
Amesbury, Mass.	....	....	....	1 75
Bangor, Me.	....	....	....	1 50
Bath, Me.	....	2 00	2 10	1 50
Baltimore	....	....	....	....
Boston, Mass.	1 75	2 00	2 10	1 40
Bridgeport, Ct.	1 15†	1 80	1 80	60
Bristol, R. I.	1 50	....	....	90
Cambridgeport, Mass.	1 80	....	....	1 40
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	1 80	....	....	1 40
Fall River	1 50	1 90	1 80	90
Hackensack	1 12†	....	....	....
Hallowell, Me.	....	....	....	....
Hartford	....	....	....	1 35
Hoboken	195	....	1 45	35
Hudson	....	1 80	....	....
Jersey City	195	....	1 45	35
Lynn, Mass	....	....	....	1 40
Middletown	....	....	....	1 35
Mystic	....	....	....	....
Newark	196	1 50	....	....
New Bedford	1 60	1 90	1 85	90
Newburyport	1 75	2 20	2 20	1 50
New Haven	1 10†	1 80	1 80	60
New London	1 45	1 80	1 80	80
Newport	1 45	....	....	90
New York	195	1 50	1 55	35
Norfolk	80	...	70	75
Norwalk	1 10†	....	....	80
Norwich	1 60	....	....	90
Pawtucket	1 75	....	....	1 00
Philadelphia	....	95	....	....
Portland	1 80	1 90	2 00	1 25
Portsmouth, N. H.	1 75@1 8.	2 20	2 25	1 50
Providence	1 45	1 90	1 80	90
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	....	....
Sag Harbor	....	....	....	....
Salem, Mass.	2 00	2 00	....	1 40
Salisbury Pt., Mass.	....	....	....	....
Stamford	1 10†	....	....	....
Stonington	....	....	....	....
Taunton	....	....	....	....
Troy	....	....	....	....
Warren, R. I.	....	....	....	1 00
Wareham	....	....	....	....
Washington	....	....	....	....
Weymouth	....	....	....	....
Wilmington, Del.	....	95	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 30. per bridge extra.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Dec. 8, 1876.

American Pig.—We are reported sales of 400 tons of the Thomas Iron Company's No. 2 foundry iron at $20. With this exception we are reported no business, and in its absence it is impossible to arrive at prices, although at least one of the companies reported to have been firm heretofore has been offering concessions. The market certainly has a very weak appearance, and much lower prices are anticipated. The decreased demand, coupled with the increased production and the existence of large stocks of iron in the hands of weak and embarrassed companies, can never bring about anything but a reduction in prices. We quote No. 1 foundry at $21@$22; No. 2 and forge at $19@$20.

Scotch Pig.—There is no business doing in this class of iron. Prices are a shade lower in Glasgow, but, as stocks in this market are very light, no change has occurred here. Latest mail advices from Scotland show that the quantity of iron on warrants continues to increase, having reached 97,687 tons on 24th ult., as against 66,294 tons at the corresponding date of 1875, while the number of furnaces in blast was 117, against 114 a year previous. We quote in this market as follows: Coltness, $29; Eglinton, $26; and Glenarnock, $28.

Rails.—We are unable to learn of any business in rails, although some is anticipated in steel at an early day. The projected steel combination is assuming more definite shape. It is now said that the several producing companies have united to purchase the various patents on the pneumatic process for the United States, and that when this shall be accomplished they will advance the royalty to $3 per ton. This, however, has not been fully consummated. We shall refer more at length to this subject shortly. There are no changes to report in the prices of iron rails, which are quoted at $35@$40 at mills, and steel at $48@$54.

Old Rails.—A sale of 185 tons at $20 is the only business reported.

Scrap is dull at $26 for No. 1 wrought.

Baltimore, Md. Dec. 6, 1876.

Specially reported by Messrs. R. C. HOFFMAN & Co.

The iron market continues in the same inactive state; sales are light at about quotations.

Baltimore Charcoal	$29@32	Anthracite No. 3	$19@20 00
Virginia Charcoal	28@33	Mottled and White	17@18 00
Anthracite No. 1	23@24	Charcoal C. B. Blooms	60 00@65
" No. 2	21@22	Refined Blooms	50@55 00

Boston, Mass. Dec. 2, 1876.

PIG is quiet, but some think that the weakness is not so marked as a week or fortnight ago. The stock here is not large. From Philadelphia it is reported that forge irons and the lower grades are scarce, and whatever weakness there may be is in No. 1 foundry. We continue to quote all the way from $19 to $24. We quote Gartsherrie $31 and Eglinton $29, currency.

BAR is quiet and steady at $48 for refined and $39 for common.—*Commercial Bulletin.*

Chattanooga, Tenn. Dec. 5, 1876.

Specially reported by J. F. JAMES, pig iron broker, etc., 233 Market Street.

No changes to report in the condition of our market since last report.

The unsettled state of the country awaiting the announcement of the Returning Boards of Lousiana and Florida, and the near approach to the end of the year has demoralized business in general. Few sales made and at former prices.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry		$20@ 21
" " " " No. 2 foundry		19@ 20
" " " " gray forge		16@ 17
" and Georgia coke, No. 1 foundry		18@ 19
" " " No. 2 foundry		17@ 18
" " " gray forge		15@ 16
White and Mottled		14@ 15
Tennessee and Georgia cold-blast car wheel		21@ 22
Alabama " "		21@ 22
Old Rails		cash 20 50
Cast Scrap		" 13
Wrought Scrap		" 18@ —

Cincinnati, Ohio. Dec. 5, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Below please find closing quotations of our pig iron market, viz.:

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	4 mos
" No 2, "	23 00@	4 mos
" Mill	21 00@22 00	4 mos
Tennessee, No. 1, Foundry	23 00@	4 mos
Tenuessee, No. 2, "	22 00@	4 mos
" Mill	21 00@	4 mos
Missouri, No. 1, Foundry	@	4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 50@23 00	4 mos
" No. 2, "	21 50@22 00	4 mos
Ohio Mill	20 00@21 00	4 mos
Missouri, No. 1 Foundry	25 00@	4 mos
" No. 2, "	24 00@	4 mos
" Mill	23 00@	4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	4 mos
Tennessee "	25 00@32 00	4 mos
Missouri "	30 00@33 00	4 mos
Alabama "	25 00@32 00	4 mos

BLOOMS.

Charcoal	50 00@ 65 00	cash

SCRAP IRON.

Cast	50c.@ 85	cash
Wrought	1 00@1 40	cash

Cleveland, Ohio. Dec. 5, 1876.

Specially reported by Messrs. C. E. BINGHAM & Co.

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	27 00@	
No. 2, " " "	26 00@	
No. 1, Anthracite	24 50@	
No. 2, "	22 50@	
No. 1, Bituminous	24 50@	
No. 2, "	22 50@	
American Scotch, No. 1, Cherry Valley	@	
" " B—1, " "	@	
" " No. 2, " "	@	
No. 1, Massillon	25 00@	
B—1, "	24 00@	
No. 2, "	21 50@	

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	27 00@	
No. 4 " "	27 50@	
Nos. 5 and 6 "	26 50@	

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	26 50@	

FORGE IRON.

No. 1, Gray	22 00@	
White and Mottled	20 50@	

Louisville, Ky. Dec. 4, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

No change since last report. "General complaint has been heard for the past week in all branches of trade of suffering in consequence of the political uncertainties. The market for pig iron has been unusually dull. But in view of the fact of the temporary cause prices have remained same as last quoted."

The usual time, 4 months, allowed on quotations below.

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$24 00@25 00
No. 2 " " "	22 00@23 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	20 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores.	21 00@22 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	20 00@21 00
No. 1 Foundry, from Missouri Ores	— @ —
No. 2 " " " "	— @ —
No. 1 Mill, from Missouri Ores	23 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@43 00
" " Tennessee "	26 00@28 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@42 00

Philadelphia, Pa.

(Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, JR., & Co., Iron Merchants, 333 Walnut Street, Philadelphia. Week ending Dec. 7, 1876.)

We have again to report a very quiet week in the iron trade of this city, and the reports from other points prove to us we are not alone, as all complain of the same dull and unsatisfactory trade. The demand continues to drag along with prices tending downward, though no large orders for future delivery at any off prices would be accepted at this time, as all feel the day is not far distant when we must have a more active market, if not higher prices. We report sales of about 1,500 tons Crane Chickies, St. Charles and Montgomery, at $20 for No. 2 and $22 for No. 1; also sale of 500 tons Chickies forge at private terms, said to be considerably above the quoted prices. We quote No. 1 $21 to $22; No. 2, $19.50 to $20; gray forge, $18.50 to $19.50.

MANUFACTURED IRON.—Bars remain as at our last, dull and unprofitable; some low sales are quoted from Pittsburg. Eastern bars are quoted at 2·1c. to 2·3c. per lb. Sheet, skelp and tank irons are in fair demand, though weak in prices. Skelp is quoted at 2¼c. to 2¼c.; tank, 2⅞c. to 7c. per lb.

RAILS.—Steel rails are reported dull of sales, at $50 to $52 at mill. There has been some movement in iron rails this week, but at very low prices. We quote $38 to $40.

OLD RAILS are quiet at $21 to $22.

SCRAP.—Cast, $14 to $19; wrought, $24 to $27.

Pittsburg, Pa. Dec. 5, 1876.

Specially reported by A. H. CHILDS.

No. 1 Foundry	24 00@25—4	mos
" 2 "	22 00@23 "	
Gray Forge	20 00@22 "	
White and Mottled	17 50@19 "	
Warm blast Charcoal	23 00@28 "	
Cold blast Charcoal Western	40 00@45 "	

Richmond, Va. Dec. 4, 1876.

Specially reported by ASA SNYDER, Esq.

Charcoal pig iron is dull. Hope when the distraction of the recent election is over this interest will revive.

Virginia Cold Blast Charcoal Pig Iron							$27 to	$33
"	Warm "	"	"	"			24 to	28
"	" "	Coke	"	"	1 X		23 to	24
"	" "	"	"	"	2 X		21 to	22
"	" "	"	"	"	3		20 to	21
"	Anthracite 1 X						— to	—
"	" 2 X						— to	—
"	" 3						— to	—

St. Louis, Mo. Dec. 5, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Our market remains firm at quotations. No change to report.

CHARCOAL.

Missouri No. 1 Found'y	$23@25	Missouri No. 1 Fd'ry	25@26
" " 2 "	22@23	" " 2 "	23@24
" Gray Mill	22@23	" Gray Mill	22@23
H. Rock No. 1 Found'y	25@26	" White & Mt'd	21@22
" " " 2 "	23½@24		
" " Gray Mill	23@24		
Tenn. No. 1 Foundry	23½@24		
" " 2 "	22½@23		
" Gray Mill	22½@23		

COKE.

Alice H. R. Ex No 1 F'y	26 00	Hanging Rock	35@46
" " 1 "	25 00	Tennessee	30@33
B, " 1 "	24 50	Kentucky	30@33
" " 2 "	23 50	Missouri	28@30
Forge	23 50	Georgia	25@30
Chat., Tenn. No. 1 Fd'y	25 00	Alabama	28@30
" " 2 "	23 50	Assorted Bar Iron $2 25, rates.	
" " Forge	22 50	No. 1 Wrought Scrap 95c. cwt.	
" " White Mtl'd	21 00	Heavy cast " 70 "	
		Light " 40 "	

COLD BLACK CHARCOAL.

All Numbers.

Montreal, Canada. Nov. 29, 1876.

We quote: Pig Iron. Eglinton and Clyde; $19.50@20.00; Summerlee $20.50@21.00; Langloan & Gartsherrie $22.50@23; Calder $21.50@22.50; Hematite $26.@27. Bar, per 100 lbs., Scotch and Staffordshire $2.@2.05; best do., $2.25@2 35, Swedes and Norway $4.75@$5; Lowmoor and Bowling, $6.@6.50.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Dec. 8, 1876.

THERE is no improvement observable in the several articles on this list. Prices, almost without exception, are weak. The present stagnation continues to be accounted for by the political uncertainties, which are having a very depressing effect, although there are, undoubtedly, associate causes.

Gold Coin.—During the week under review gold has ranged from 108⅞ to 107¼, and closed at 107¼.

Bullion.—There has been an important advance during the week under review, owing to an East India demand; the increased prospects of war in the Orient, and the recommendations of our Secretary of the Treasury that authority be given to issue subsidiary coins to the extent of $80,000,000. The price in London closed at 56d.@56¼d., and here at $1.20⅛@$1.21, and San Francisco at 8 per cent. discount.

Copper.—About 150 000 lb. are reported to have been sold at 20c. In consequence of a decline in the price of gold, but 19¼c. is now bid, although 20c. is still asked. Consumers have no wants, there being no demand for their wares, so that the outlook for the early future is not encouraging.

Tin.—Straits is quoted in London at £76 10/, while here it is quoted at 17⅝c.@17¾c., gold; L. & F., 17½c.; Refined, 17½c.; and Banca, 19⅛c. There is no business, worthy of note, doing.

Tin Plates.—These are quiet and without change of price, although firmer, owing to advanced rates in England. We quote as follows, gold, per box: charcoal tins, $6.75@$7, and ternes, $6@$6.50; coke tins, $6, and ternes, $5.50@$5.75.

Lead.—There appears to be conflicting views and reports relative to the business doing. We are reported of Western and California lead to arrive, sales as follows: 300 tons at 6 07½c.; 100 at 6·05c.; and 200 at 5·95c. The market is very quiet and entirely nominal at 6c.@6·10c., currency, according to quality.

Spelter and Zinc.—Domestic spelter is quoted a 6¾c.@6¾c., currency, according to quality, and is very quiet. Sheet zinc is quoted at 8¼c.@8¼c., currency.

Antimony with but a moderate business is quoted at 13¼c.@13½c., gold.

Quicksilver.—This article is not so strong. The price here is 60c., gold, per lb.; in San Francisco, 55c.@57½c.; and in London £8 10/ per flask.

The San Francisco *Commercial Herald* of December 7 says of Quicksilver: "We have a cablegram from Hong Kong quoting spot sales at $80 per picul; in London £8 10/ per bottle—this latter is equal to 52½c. here. With us the price is nominal at 55c., and if our large mine producers wish to retain this China trade they will have to drop the price to 50c. The outgoing steamer to Hong Kong will carry a full average shipment, the bulk of which was bought some time since at 55c. The receipts for November promise to foot up the largest of any month this year. The late rise of 10c. stimulated production considerably from mines that had been keeping back rich ores when low prices ruled."

THE SALT LAKE CITY ORE AND BULLION SHIPMENTS

for the week ending Nov. 25th, were as follows:

CARS BULLION.—To Omaha, 19; to Newark, 20; to Pittsburg, 1; to St. Louis, 3; to New York, 5.

CARS ORE.—To Pittsburg, 10; to Sacramento, 19; to Wyandotte, 3. Total cars of bullion and ore, 80.

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Dec. 8, 1876.

The dealings in this market for this week show a decrease of nearly 3,000 shares, the total only reaching 86,000 shares. The quotations are generally well maintained, and in some instances we note an advance. The market, however, has been very irregular, and we note that a number of the transactions are based upon future deliveries, generally about 2 per cent. below the present market value.

New Jersey Central Railroad.—11,345 shares comprises the week's dealings in this stock. The quotations have ranged from 35¼ to 33⅛, closing at 31¼.

Delaware, Lackawanna and Western Railroad.—About 71,000 shares of this stock have changed hands at 71⅝ @69⅜, closing at 71. To give an idea of the superior economy of narrow gauge over broad gauge railroads, it is stated that since this road has been reduced in gauge, two or three cars are added to every freight and coal train, without adding to the expense for fuel. In consequence of the trouble with their mechanics at Scranton, it is stated that the company will send sixty or seventy of their broad gauge engines to Patterson for alteration to narrow gauge, and will probably send orders for sixteen new engines to the Patterson shops.

Delaware and Hudson Canal Company.—2,082 shares of this stock have changed hands at from 71¼@69 closing at 70. The wages of the trackmen on this company's railways have been reduced to ninety cents per day. It is stated that arrangements are about to be made under which Delaware and Hudson and Lehigh and Susquehanna trains will connect for the better accommodation of travel between Scranton and Carbondale.

The Bond Market does not exhibit much change, the total dealings amounting to $121,000.

Pennsylvania Coal Company.—Extensive improvements are being made by this company on their road between Hawley and Dunmore.

The Consolidation Coal Company.—This company declared a half yearly dividend of 2¼ per cent., amounting to over $250,000, on the 5th inst. There can be but very little, if any, doubt, that the coal business of this company this year has been an unprofitable one. By the exorbitant rates that have been charged upon the company's railroads, profits have been realized from its carrying business, but the actual amount so earned cannot be determined until after some decision has been given by the courts as to the legality of the charges that have been made for tolls, which have been paid under protest by competing coal companies. Upon the 19th inst., the case of the American Coal Company to recover overpayments, made under protest, will come before the Court of Appeals, and should the case go against the Consolidation Company, it would so reduce its earnings as would probably scarcely enable it to pay the interest on its whole indebtedness, and make the regular provisions for its sinking fund. Under these circumstances, the declaration of this dividend has caused some surprise. It is generally conceded that the action is injudicious, and that in the face of the great loss of trade and the reduction in tolls which are inevitable, the company should have hoarded all its resources. It is scarcely necessary to add, that there are ill-disposed persons who suggest that this dividend was declared in order to give strength to the stock with the view of letting a favored few unload. In spite of this tonic, the stock is weak and drooping.

The Buchanan and Clifton Forge Railway.—This Company has been organized by the Kanawha and James River Canal Company which takes $400,000 in stock. $67,000 additional has been subscribed, and a strong effort is being made to secure an additional $33,000. It is proposed to put 400 convicts on the work soon, as a bill authorizing the State authorities to do so passed the Legislature of Virginia last year. The railway will bring the immense deposits of iron ore on the James river below Lynchburg into connection with the furnaces on the Ohio river and open up a large trade with that section. It will also open a new market for the coals of the Kanawha valley, increasing very largely the demand for them. Kanawha coal sells now in Lynchburg and other cities on the Southside road at very high prices. The iron ores on the James River are of a special quality, and are used in the production of Bessemer steel. These ores can be delivered at Wheeling cheaper than the Missouri or Lake Superior ores, and large contracts for them can be secured at once. The work of building the road was commenced by breaking ground at what is called Saltpetre Cave, on the James River. This road when completed will constitute an important link in the Straight shoot road from Clifton Forge to Richmond, and will be the best road for Richmond that has ever reached the city. Virginia has much to gain from it, as it will do much to put her immense deposits of iron ores, of the Magnetic, Spathic, Fossil, Hematite, &c., on the markets of the world.

Quotations and Sales of Stocks and Bonds,

For the week ending Dec. 8, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	250	—
Consolidation Coal Co	—	—	32	—
Spring Mt. Coal Co	—	—	†60	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	11	—
Del., Lack., and West. RR. Co.	71⅝	69⅜	71	71,333
New Jersey Central RR. Co.	35¼	33⅜	34¼	11,345
Delaware and Hudson Canal Co.	71¼	69	70	2,082
Quicksilver Mining Co. pref'd	21¼	19	18½	300
" " " Common	14	14	13	50
Mariposa Land & Min. Co. pref'd	5	4⅛	5	1,000
St. Louis & Iron Mountain RR.	11	11	10	50
Total Shares sold				86,160
Sales for the week previous				89,107
Decrease				2,947

* Nominal. † Asked.

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	2,000	@108
" " " 7's Con'ble	J. & D.	....	@100
Cent'l RR. of N.J., 1st M., New	F. & A.	17,000	108¾@109
" " " 1st Cons.	.....	10,000	@ 79½
" " " Convert'le	M. & N.	3,000	77 @ 79
Lehigh & W.-B'e, Con. Guar'd.	.....	7,000	63 @ 63¾
Am. Dock & Imp. Mt. Bonds	J. & J.	....	@ 66
Del. & Hud. Can., 1st M., 1891	.....	76,000	103 @105
" " " 1884	.. ....	....	@103½
" " " 1877	.....	....	@101½
" " " Coup. 7's, 1894	.....	....	@ 98
" " " Reg'd 7's, 1894	.....	.....	@ ....
St. L. & Iron Mountain, 1st M	F. & A.	6,000	@101¾
" " " 2d M	M. & N	.....	@ 70
Chesapeake & Ohio 6's, 1st M.	.....	....	@ 31
" " " Ex. Coupon	.....	.....	@ 20
Mariposa Gold Loan con. 7s	.....	.....	@100⅝
Total sales			$121,000

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, Dec. 7, 1876.

THE quotations in this market are generally lower, the transactions aggregating about 77,000 shares, a difference of less than 100 shares as compared with the business of the previous week. The uncertainty of the political situation operates materially against the stability of the market, the consequence is a very unsettled feeling and a disinclination among dealers to operate.

Pennsylvania Railroad.—About 25,000 shares represent the business in this stock, and ⅝ the extreme range in the price. The final quotation of 45⅝ is equal to a decline of ¼ per cent.

Reading Railroad.—This stock has sold to the extent of about 37,000 shares, at from 21⅛@19⅞, closing at the lower figure.

The London *Times* of the 22d ultimo, contains this notice:

"Messrs. McCALMONT BROTHERS & Co., notify that the sterling coupons and drawn bonds, due December 1, of the Perkiomen Railroad consolidated mortgage 6 per cent. bonds, and also the coupons of the Philadelphia and Reading Railroad consolidated mortgage 6 per cent. bonds, due December 1, will be paid at their counting house on and after that date."

The same paper, in its money article, says: "United States railway securities have again declined. Philadelphia and Reading Railroad bonds are still sinking, notwithstanding the news that the dividends next falling due will be met."

The company are curtailing expenses by dispensing with express agents, and placing the offices in charge of the station agents at the various stations along the line.

Lehigh Valley Railroad.—This stock closes at 47, equal to 94 per cent. of its par value and 4 per cent. below the final price of a week ago. The transactions in this stock have been very limited, scarcely reaching 700 shares.

The freight carried over the road by the Waverly line has increased this year over last. Last year the number of freight cars run over this road by this line, was about 15,000. This year, for eleven months, to Nov. 1, the number of cars was increased to about 32,000.

Lehigh Coal and Navigation Company.—14,243 shares of this stock have changed hands at prices ranging from 28⅝@27, closing ⅜ above the lower figure.

Monocacy and Oley Furnace Railroad.—The building of a railroad from Monocacy to Oley Furnace via Friedenburg, Berks County, is again projected.

Wilmington and Reading Railroad.—On the 4th inst., Mr. THOMAS ELLIS, auctioneer, sold at the Merchants' Exchange, in Philadelphia, under foreclosure of first mortgage, the Wilmington and Reading Railroad, rolling stock, equipments and appurtenances, for $100,000. The whole amount of the mortgage is $1,250,000, which is followed by a second mortgage for $750,000. The whole amount of this second mortgage is cut off and is lost, as is also one-quarter of a million of the first mortgage. The purchase is understood to be for account of a committee of the first mortgage holders. The price is considered low, though the work was never worth its cost. The line of the road is from the city of Wilmington, Delaware, to the city of Reading, Pennsylvania, passing to the west of Philadelphia, through a rural district most of the way.

Pennsylvania Salt Manufacturing Company.—We note a recent auction sale of 20 shares of the stock of this company at $64 per share.

Quotations and Sales of Stocks and Bonds,

For the week ending Dec. 7, 1876.

STOCKS.

	Highest	Lowest	Closing	Shrs
Lehigh Valley RR. Co.	48¾	47	47	697
Pennsylvania RR.	45⅞	45¼	45½	24,900
Reading RR.	21½	19⅞	19⅞	36,904
Lehigh Coal and Nav. Co.	28⅝	27	27⅞	14,243
Penn. Canal	—	—	*9	—
Buck Mountain Coal Co.	—	—	*25	—
Fulton Coal Co	—	—	*3½	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	*85	—
St. Nicholas Coal Co	—	—	*1	—
Cambria Iron Co	—	—	14½	—
Crane Iron Co	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co.	—	—	64	50
Total shares sold				76,774
Sales for the week previous				76,700
Increase				74

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	$ —	— @107
" " " 2d " "	—	— @102
" " " 3d " cons	—	— @ 38
Lehigh Valley RR. Con. mtg. 6s	—	97⅞@ 98¾
" " " 7s, 1910	11,000	114⅛@115¾
" " " 6s Reg.	—	@107¾
" " " 6s coup.	—	@106
Pennsylvania RR., 1st mtge. 6s	—	@108
" " " gen. " cou. 1910	—	@108
" " " gen. " 6s, reg.	—	@106½
" " " Cons. M. 6s reg.	1,000	@100
Phil. & Reading RR. Con. M. 7s Reg.	1,000	@ 95⅛
" " " G. M. 7s, coup.	—	@100
" " " Gen. M. 7s reg.	—	@103
" " new convertible 7s	5,700	71½@ 72
" " 6s 1880	—	@103⅛
" " Cons M. 7s coup.	27,000	96¾@ 97
" " debenture 6s	—	@ 65
Phil. & Reading C. & I. Co. Deb. 7s	—	@ 69
" " Helfenstein tract	—	@ 65
Lehigh Coal & Nav. Co., 6s '84	700	@104½
" " " RR. 6s, '97	8,600	100¾@101
" " " con. 7s	—	@ 90
" " " 6s gold loan	6,00	@102
" " " Conv. gold loan	—	@101¼
Penn. Canal, 6s	4,000	@ 73
Penn. and N. Y. Canal, 7s	6,000	108 @109
Ches. and Del. Canal, 6s	—	@ 85
Susquehanna Canal, 6s	—	@ 68
Delaware Division Canal, 6	—	@—
Susquehanna Coal Co. 6s	—	@ 78
Buck. Mount Coal Co. 6s	—	@—
Penn. Gas Coal Co. 6s	—	@—
Honeybrook Coal Co. 7s	—	@—
Total amount of sales	$71,500	

Closing quotations, in the absence of sales, represent the latest prices bid.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Dec. 7, 1876.

THE market closes dull and weak, although during the early part of the week there was a trifle more doing than for some weeks past. Calumet has shot up from 172 to 174, sales, and back to 172½, the best bid. Copper Falls very dull at 4 to 4¼. Duncan has again been the trump card for speculation, starting at 6¾ up to 7, and has been backing and filling between 6 and 7 until this morning, when it broke to 5¼. The meeting of the Duncan occurred yesterday P. M., and showed that the mine is not doing as well as was expected by the stockholders. Their expenses are between $3,000, and $4 000 per month.

International declined to 50c. sales in sympathy with Duncan. National has been offered during the week at at 1½, but is now that bid. There were some forced sales of Pewabic during the week at $2, but no stock is now offered under $3. In small coppers nothing doing.

Gold and Silver Stocks.

AMERICAN MINING AND STOCK EXCHANGE.

NEW YORK, FRIDAY EVENING, Dec. 8, 1876.

THE nominal sales on the American Mining Stock Exchange have amounted to 50,385 shares for the week; reference to our list of the quotations will indicate pretty clearly the course of the market. The following summary regarding the condition of the various mines on the Comstock Lode is taken from our latest exchanges:

Consolidated Virginia.—Daily yield, 400 tons of ore. The ore breasts on every level from the 1,400 down to the 1,550-feet level are yielding rich ore and looking well at all points. There has been no delay with the mills for this month, and the yield of bullion up to the 29th of November is over $100,000 in excess of that for the previous month to the same date. The final clean up at the close of the month will probably increase the returns another $100,000 or more. The west drift on the 1,650-feet level of the C. and C. shaft is in a distance of 355 feet, the face in good running ground. With reasonable success this drift will reach the ore vein by or before the last day of December. The north drift on the 1,700-feet level has been put in the best of repair and is again advancing at a steady pace to the northward.

California.—Daily yield, 400 tons of ore, keeping the mills all running up to their full crushing capacities. The ore breasts are showing splendidly at all points. The yield of rich ore from the 1,400-feet level is steadily on the increase as the stopes advance to the northward. On the 1,500, 1,550, and 1 600-feet levels the ore stopes never appeared better or gave better promise for the future than at the present. On the 1,550-feet level the rich ore is still widening out to the eastward, seeming almost boundless in that direction. On the 1,650-feet level the face of the south drift running through the center of the ore vein is still in ore of a fair quality. The mine, in fact, is showing well at every level, and has every promise of as rich or better returns for a year or more to come than it has ever yet afforded in the past. Sinking the C. and C. shaft is making good headway, the bottom still in hard blasting rock. The flow of water is strong, but is now kept well under control with the pumps.

Belcher.—Daily yield from 200 to 220 tons of ore. The ore breasts and stopes are showing fully as well as usual and the pulp assays indicate a much better yield of bullion for the amount of ore crushed for the present month than has been made for several months past. Sinking both the drain and air shaft and the main incline is making good progress. This is especially the case with the drain shaft, which has been sunk a dis-

MINING STOCKS.

AMERICAN MINING AND STOCK EXCHANGE.

Name of Company.	Location.	Feet on Vein.	Capital Stock.	a No. of Shares.	Total Assessments Levied.	Date and Amount of Last Assessment per share.	Total Dividends paid.	Date and Amount of Last Dividend per share.	Closing Quotations g American Currency. Sat.	Mon.	Tues.	Wed.	Thurs.	Fri.	Shares sold during the week.
Alpha Cons. G. S.	Nevada,	300	$ 3,000,000	30,000	$180 000	Aug. 12, '75, $1.	....	.....	$39 75	$40 50	$36 00	$39 00	$37 50	$37 37½	1,050
Belcher, G. S.	Nevada,	1,040	10,400,000	104,000	660,400	April 14, '71, $4.	$15,397,200	April 10, '76, $1.	14 37½	15 75	15 25	15 75	14 50	14 50	1 0.0
Bertha Gold Co.	Virgi'a.	645 acs.	300,000	30,000	**	.....	....	.....	2 87½	3 12½	3 12½	3 12½	....	2 50	1,050
Best and Belcher, G. S.	Nevada,	545	10,080 000	100,800	136,192	July 13, '74, 50c.	....	.....	50 50	50 25	49 00	48 75	48 25	49 50	1,150
Bullion, G. S.	Nevada,	943⅛	10,000,000	100,000	2,052,000	Sept. 22, '76, $2.50.	....	.....	33 62½	34 50	35 00	....	34 00	....	600
Caledonia, G. S.	Nevada,	2,188	10,000,000	100,000	1,210,000	Aug. 28, '76, $1.00.	....	.....	14 87½	14 62½	13 50	*13 12½	....	13 25	630
California, G. S.	Nevada,	600	54,000,000	540,000	....	.....	7,560,000	Nov. 15, '76, $2.	55 75	58 50	50 00	53 50	50 00	50 00	160
Centennial, G.	Califor.	66 acres	1,000,000	100,000b	**	.....	....	.....	....	....	....	....	....	....	....
Chollar Potosi, G. S.	Nevada,	1,400	2,800,000	28,000	1,282,000	June 26, '76, $5.	3,080,000	Feb. 10, '72, $1.	84 00	84 00	*82 50	92 50	89 75	89 50	425
Cleveland, G.	Colo.	3,715	250,000	25,000b	....	.....	....	.....	9 12½	9 25	9 00	9 12½	9 50	9 00	7,1.0
Cons. Hercules & Roe, S	Colo.	16,500	1,000,000	100,000	**	.....	120,000	.....	....	....	....	....	....	....	....
Cons. Imperial, G. S.	Nevada,	468	50,000,000	500,000	125 000	July 25, '76, 25c.	....	.....	....	3 12½	3 25	3 25	3 12½	3 37½	2,400
Con. N. Slope & E.C.T.	Colo.	15,000	500,000	10,000	**	.....	....	.....	*10 50	....	....	*7 00	....	....	.....
Cons. Virginia, G. S.	Nevada,	710	54,000,000	540'000	411,200	June 11, '73, $3.	24,840,000	Nov. 11, '76, $2.	*55 00	54 00	50 00	52 50	49 50	48 50	190
Confidence, G. S.	Nevada,	130	2,496,020	24,962	243,840	March 18, '73, $1.	78,000	May 1, '65, $8.33⅓	13 25	....	....	....	....	....	100
Crown Point, G. S.	Nevada,	600	10,000,020	100,000	1,172.370	Oct. 26, '76, $1.	11,588,000	Jan. 12, '75, $2.	10 12½	....	9 87½	9 87½	9 87½	....	700
Douglas Mining Co.	Colo.	21,000	1,000,020	10,000	**	.....	....	.....	....	....	....	....	....	....	....
Eureka Cons. G. S. L.	Nevada,	..	5,000,000	50,800	100,000	May 26, '76, $1.	1,000,000	Aug. 5, '75, $1.	....	....	....	10 50	*15 00	11 50	450
Exchequer, G. S.	Nevada,	400	10,000,000	100,000	280,000	Sept. 23, '76, $1.	....	.....	15 00	14 87½	15 50	*16 00	14 25	14 50	800
Gould and Curry, G. S.	Nevada,	621	10,800,000	108,000	2,018,000	Dec. 11, '76, $1.	3,934,800	Oct. 10, '70, $10.	13 50	13 87½	14 00	14 50	14 50	13 75	1100
Grant, G. S.	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	7 75	8 00	7 87½	8 00	8 25	8 25	7,800
Granville Gold Co.	N. Car.	9,000	1,000,000	100,000	**	.....	....	.....	1 87½	2 00	2 00	1 87½	....	2 75	2,400
Hale & Norcross, G. S.	Nevada,	400	11,200,000	112,000	2,247,000	Oct. 10, '76, $1.	1,598,000	April 10, '71, $5.	8 00	8 50	7 75	8 50	8 00	8 00	2,200
Hukill, S.	Colo.	3,288	1,000,020	10,000	**	.....	20,000	Nov. 1, '76, $1	....	....	....	....	....	....	.....
Indian Queen, S.	Nevada,	1,000	3 000,000	60,000	....	.....	60,000	.....	....	....	....	....	....	....	.....
Julia Cons. G. S.	Nevada,	3,000	11,000,000	110,000	Sept. 11, '76, $1.	....	.....	*6 37½	*6 37½	....	6 37½	6 75	6 62½	800
Justice, G. S.	Nevada,	2,100	10,500,000	105,000	1,502,500	Sept. 14, '76, $5.	....	.....	28 75	28 50	24 50	28 50	25 00	28 00	8.0
Kentuck, G. S.	Nevada,	95	3,000,000	30,000	270,000	Dec. 3, '74, $1.	1,252,000	March 8, '70, $5.	*10 00	10 00	*11 00	11 25	10 37½	10 25	650
Kossuth, G. S.	Nevada,	2,700	5,400,000	108,000c	405,000	Aug. 15, '76, 50c.	....	.....	....	*2 12½	....	....	....	....	....
Leopard, G. S.	Nevada,	1,500	5,000,000	50,000	50,000	March 31, '76, $1.	137,500	Nov. 15, '76, 50c.	6 50	6 87½	....	....	7 50	....	700
Luzerne Mining Co.	Colo.	4,200	5,000,000	500,000	**	.....	....	.....	2 12½	2 25	2 12½	2 37½	2 62½	2 00	4,800
Mer. and Min. Tun. Co.	Colo.	30,000	500,000	50,000	**	.....	....	.....	....	....	....	....	....	....	....
Merrimac, S.	Mass.	600	10,080,000	100,800	100,800	Sept. 5, '76, 50c.	....	.....	3 75	3 50	3 25	3 62½	3 25	3 25	1,400
Mexican, G. S.	Nevada,	1,500	500,000	50,000b	**	.....	10,000	Nov. 10, '76, $1.	26 25	27 12½	....	26 50	25 00	24 50	1,000
Morning Star	Nevada,	1,600	8,000,000	80,000	....	.....	....	.....	....	....	....	....	....	....	.....
Northern Belle, S.	Nevada,	1,600	5,000,000	50,000	....	.....	900,000	Nov. 15, '76, $1.	....	....	....	....	....	....	.....
Ophir, G. S.	Nevada,	675	10,080,000	100,800	2,034,400	May 14, '75, $2.	1,394,400	March 9, '64, $4.	48 50	*50 75	*49 25	47 50	48 co	47 50	460
Original Comstock, G. S.	Nevada,	....	10,000,000	10,000	....	.....	....	.....	....	1 25	*87½	25	....	12½	300
Overman, G. S.	Nevada,	1,200	3,840,000	38,400b	2,222,280	Oct. 21, '76, $3.	....	.....	....	....	*125 00	131 75	....	....	20
Pleasant View	Colo.	1,200	200,000	20,000c	**	.....	....	.....	....	1 37½	*1 75	*1 62½	....	....	100
Raymond and Ely, G. S.	Nevada,	5,000	3,000,000	30,000	510,000	Nov. 5, '75, $3.	3,075,000	Sept. 10, '73, $3.	6 12½	6 00	5 50	5 00	....	4 87½	1600
St. Joseph Lead Co.	Missou.	2600 acs.	1,000,000	100,000	....	.....	210,000	.....	....	6 00	6 00	6 12½	6 12½	6 25	.....
Santiago, G. S.	Nevada,	2,000	11,200,000	112,000	....	.....	....	.....	....	....	....	....	....	....	.....
Savage, G. S.	Nevada,	800	11,200,000	112,000	2,746,000	May 31, '76, $2.	4,460,000	June 11, '69, $3.	12 62½	12 75	11 25	11 75	11 50	11 62½	1,600
Seg. Belcher, G. S.	Nevada,	160	640,000	6,400	244,800	April 11, '76, $5.	....	.....	....	....	....	....	100 00	100 00	110
Sierra Nevada, G. S.	Nevada,	3,650	10,000,000	100,000	1,500,000	Oct. 24, '76, $1.	102,500	Jan. 16, '71, $1.	13 50	....	*13 50	14 00	14 25	....	990
Silver City, G. S.	Nevada,	3,900	6,310,000	63,100	....	.....	....	.....	*1 50	....	*1 50	....	....	....	..
Silver Hill, G. S.	Nevada,	5,400	10,800,000	108,000	810,000	Sept. 18, '76, $1.	....	.....	10 00	10 00	9 62½	11 50	12 00	12 12½	950
South Comstock, G. S.	Nevada,	1,500	10,000,000	100,000	44,000	May 3, '76, 10c.	....	.....	....	....	....	....	....	....	.....
South, California, G. S	Nevada,	1,500	5,000,000	50,000	....	.....	....	.....	....	....	....	....	....	....	.....
Southern Star, G. S.	Nevada,	1,500	6,000,000	600,000	....	.....	....	.....	....	1 37½	*1 25	1 25	1 25	....	180
Trenton, G. S.	Nevada,	..	10,000,000	100,000	....	.....	....	.....	....	....	....	....	....	....	.....
Union Cons. G. S.	Nevada,	850	10,000,000	100,000	260,000	March 3, '76, $1.	....	.....	13 25	13 25	13 37½	13 00	13 50	13 12½	850
West Belcher, G. S.	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	....	....	....	2 37½	....	....	500
Yellow Jacket, G. S.	Nevada,	1,200	12,000,000	120,000	2,718,000	Oct. 28, '76, $1.	2,184,000	Aug. 10, '71, $2.50.	*21 00	18 50	17 25	19 00	16 00	17 50	1,300
Young America, S.	Nevada,	1,000	3,000,000	30,000	6,000	Oct. 23, '76, 20c.	....	.....	....	....	....	....	....	....	... ..
			Assessments levied to date, $27,647,782			Div'ds pd. to date, $83,001,400								Total sales.....	50,385

BOSTON STOCK MARKET.

									Fri.	Sat.	Mon.	Tues.	Wed.	Thurs.	
Allouez, C.	Mich.	..	$1,000,000	20,000c	$940,000	May 9, '76, $5.	....	.....	$8 00	8 00	8 00	8 50	8 00	8 00	.....
Calumet and Hecla, C.	Mich.	2¾ mile	2,000,000	20,000d	1,200,000	.....	$11,050,000	Oct. 21, '76, $5.	172 00	173 50	173 00	173 00	173 50	172 50	.....
Central, C.	Mich.	..	500,000	20,000c	100,000	June, '62, 65c.	1,020,000	Feb. 17, '76, $5.	35 00	35 00	35 25	35 00	35 00	35 00	.....
Copper Falls, C.	Mich.	..	1,000,000	20,000d	535,000	May 10, '76,	100,000	Nov., '71, $1.	3 62½	3 75	3 87½	3 75	3 87½	4 00	.....
Dana, C.	Mich.	..	500,000	20,000d	68,000	Jan., '73, 50c.	....	.....	10	10	10	10	10	10	.....
Dawson, S.	Canada.	..	1,200,000	60,000f	....	.....	.. ..	.....	10	10	12½	13	12½	12½	.....
Duncan, S.	Canada.	..	1,200,000	60,000f	75,000	July, '76, 41½.	....	.....	6 75	6 00	6 12½	6 12½	6 50	5 12½	.....
Franklin, C.	Mich.	..	500,000	20,000d	360,000	June, '68, $5.	585,000	Nov., '71, $1.	13 50	13 62½	13 50	13 50	13 50	13 50	.....
†Humboldt, C.	Mich.	..	500,000	20,000d	100,000	Sept. 28, '76, 15c.	....	.....	3	3	2	3	3	3	.....
International, S.	Canada.	..	1,200,000	60,000f	....	.....	....	.....	56¼	50	50	56¼	56¼	43¾	.....
Madison, C.	Mich.	..	500,000	20,000d	123,000	Sept. 11, '74, 10c.	....	.....	27	26	28	28	27	27	.....
Mesnard, C.	Mich.	..	500,000	20,000d	160,000	April 12, '65, 50c.	....	.....	28	28	26	28	26	26	.....
Minnesota, C.	Mich.	..	1,000,000	20,000e	436,000	June 10, '69, $1.	1,820,000	Mch. 15, '76, 50c.	1 50	1 50	1 62½	1 75	1 75	1 62½	.....
National, C.	Mich.	..	500,000	20,000e	195,000	Oct., '75, $1.	360,000	Oct., '73, $1.	2 00	2 00	1 87½	1 50	1 37½	1 50	.....
Osceola, C.	Mich.	..	1,000,000	40,000d	880,000	May 1, '76, $2.	....	.....	18 00	18 50	18 co	18 00	18 50	18 50	.....
Petherick, C.	Mich.	..	500,000	20,000d	165,533	March 22, '76, 50c.	....	.....	50	48	45	40	40	40	.....
Pewabic, C.	Mich.	..	500,000	20,000d	185,000	June, '68, $3.	460,000	July, '73, $1.	3 00	2 50	2 25	2 00	2 37½	2 50	.....
Phenix, C.	Mich.	..	1,000,000	20,000d	817,500	Sept., '70, $3.	....	.....	....	....	....	....	....	....	.....
Quincy, C.	Mich.	..	h 200,000	20,000b	....	.....	2,050,000	Oct. 28, '76, $3.	47 00	46 50	46 50	46 50	46 50	46 50	.....
Ridge, C.	Mich.	..	500,000	20,000d	....	.....	....	.....	5 25	5 12½	5 50	5 73½	5 37½	5 25	.....
Rockland, C.	Mich.	..	500,000	20,000d	495,000	Jan., '74, $1.	....	.....	25	25	25	28	27	27	.....
Star, C.	Mich.	..	500,000	20,000d	265,000	March 30, '76, 50c.	....	.....	35	35	35	35	35	35	.....
Superior, C.	Mich.	..	500,000	20,000d	340,000	March, '74, 25c.	....	.....	12⅛	12⅛	12⅛	12⅛	12⅛	12⅛	.....
			Assessments levied to date, $7,440,033			Div'ds paid to date, $17,445,000								Total sales ..... —— shares.	

G. Gold. S. Silver. L. Lead. C. Copper. a The par value of shares is $100, unless otherwise designated. b Par value $10. c Par value $50. d Par value $25 each. e Par value $15. f Par value $22. g Closing quotations represent the latest prices bid. Prices asked will have a * affixed. h Full paid. i On the four old companies. ** Not Assessable. †Ass. unp. aid.

tance of 22 feet during the week. In the main incline the flow of water has been very strong for several days past, giving considerable trouble on account of the great heat. At the bottom the thermometer stands at 130 to 136 degrees. The prospecting drifts on the 1,600-feet level are all being pushed steadily forward.

Yellow Jacket.—A downcast was recently made of the south compartment of the shaft and all the air of the mine was turned into the Imperial mine through the connecting drift on the 1,940-feet level. This necessarily created so much heat that all work had to be suspended on the lower levels for several days. It is now rapidly cooling off, and the starting of a draft of air through will no doubt greatly benefit both mines. A winze has been started on the north line on the 1,740-feet level to cut a favorable seam of ore recently found in the east crossut on the same level. Sinking the new shaft is making splendid progress, the bottom being in good sinking ground, and the work pressed ahead with great energy. It is now down 114 feet, and well timbered to the bottom.

Ophir.—Daily yield 200 tons of ore, keeping the Santiago and the Nevada mills crushing to their full capacities. The ore stopes on the 1,550, the 1,600 and 1,650-feet levels are yielding finely, those on the 1,650-feet level showing a steady and gradual improvement. The north drift on the 1,600-feet level running to reach the Mexican south line, is making splendid headway, the face still in porphyry. The prospecting drifts north and east on the 1,700-feet level are steadily advancing without change of interest. Sinking the main incline is making good headway.

Bullion.—The main north drift and east cross-cuts, on the 1,400-feet level, afford no new features whatever. The face of all the drifts on that level are in soft porphyry and ledge matter. The face of the south drift, on the 1,500-feet level, is showing a fine character of lively quartz, with every indication of a large concentrated body in that portion of the mine. The north drift, on the 1,500-feet level, being run for the double purpose of ventilation and prospecting the ledge, will in all probability soon complete a connection with the north winze. The men in the opposite drifts are so near each other that they can converse with ease, so that the connection cannot long be delayed. The north drift, on the 1,700-feet level, is steadily advancing, following the west wall of the ledge, and shows no important changes during the week. The porphyry in the face of the north drift, on the 2,000-feet level, running through the Alpha ground, is becoming softer and carries streaks of quartz of a very lively character. The ventilation of the mine is gradually improving in every part. No trouble whatever has been experienced with the ventilation in the north drift on the 2,000-feet level.

Julia.—The quartz in the face of the south drift on the 1,800-feet level shows a constant improvement as the drift advances to the southward. The west crosscut on the 1,800-feet level, started at a point 542 feet south of the shaft, is making good progress, the face of the drift being in quartz of a very solid and fine character. The entire prospects on the 1,800-feet level are of a far better description than anything that has heretofore been found in that portion of the mine. The south drift on the 1,600-feet level, running to connect with the Ward shaft, is showing some splendid quartz. The ledge is evidently improving to the southward, the quartz becoming more solid, and the prospects of ore much finer.

Silver Hill.—Sinking the main incline shaft is making about two feet per day, the rock in the bottom being extremely hard and tough to blast. The north drift, on the 444-feet level, is advancing at the rate of four to five feet per day, the face in ledge material. This drift is now within about 150 feet of the Justice South line. The flow of water from this drift is very slight. The water in the bottom of the main incline also gives but little trouble.

Sierra Nevada.—The flow of water at the bottom of the shaft is still quite strong, but is kept under good control by the pumps. The north and south drifts on the 1,700-feet level are each steadily advancing, without any important change. The prospecting drifts on the third, second and first station levels are all advancing at the usual fair rate of speed.

Chollar-Potosi.—Daily yield 100 tons of ore, the assay value of which is $30 per ton. Sinking the main incline shaft is making steady progress at the rate of 2½ feet per day. The rock in the bottom blasts out finely, and the flow of water gives but little trouble. Sinking the

combination shaft is making splendid progress, the rock in the bottom working well.

Justice.—Daily yield 260 tons of ore, keeping the mills all running up to their full crushing capacity. The ore slopes extending from the 400 down to the 800-feet level were never yielding richer ore or showing better than at the present time. The ore is extending both north and south on the 700 and 800-feet levels, and is richer in the bottom of the winze below the 900-feet level than at any point on the levels above. The south drift on the 1,000-feet level is making excellent headway, the rock in the face gradually getting softer, with every appearance of a near approach to the ledge. No change in the face of the north drift on the 1,000-feet level.

Imperial Consolidated.—Sinking the north winze below the 2,000-feet level is making fair headway. The east cross-cut on the 2,000-feet level is advancing rapidly, the face of the drift in very favorable ledge material. The north drift on the 2,135-feet level is making good progress.

Overman.—Sinking the main shaft is making splendid progress. The north and south drifts on the 1,200-feet levels are each steadily advancing, with very favorable prospects of ore deve'opments ahead. The erection of the new pumping engine is making excellent progress.

Hale and Norcross.—The pumps are doing splendid work, having run at the rate of 7¼ strokes per minute for almost the entire week. The gain on the flow of water has been about five feet during that length of time.

Savage.—The pumps have been kept busy during the week with varying success. Sometimes the water would rise or apparently gain on the pumps while at other times it would recede for a number of feet. The gain is steady though slow.

Caledonia.—Sinking the shaft is again making good progress. The north drift on the 1,100-feet level is passing through favorable ledge matter, and is being pushed ahead with great energy.

Sutro Tunnel.—Face of header in hard porphyry with frequent small seams of quartz and clay. The drills are working to very good advantage in this material. Total length of tunnel last evening 15,107 feet.—*Gold Hill News*, Nov. 29th.

Bank of California.—The eighth assessment of $10 per share of this institution has all been paid in. We note recent sales of the stock of the bank at par.

Bank of Nevada.—It is reported that the capital of the Bank of Nevada will be increased to $20,000,000 on the 1st of January next.

The Redington Quicksilver Mining Company, has announced its usual monthly dividend of $10 per share payable on demand.

Gas Stocks.

NEW YORK, FRIDAY EVENING, Dec. 8, 1876.

Gas stocks are steady and the dealings very limited. We shghtly advance a few of the quotations, the remainder being unchanged as compared with our last.

Lighting the Streets of New York.—The Park Commissioners held their weekly meeting on the 5th inst., when they received proposals for lighting the lamps in the city during the first four months of 1877. Gas companies alone competed for the awards, notwithstanding contractors and others were invited to bid. The following bids were received:—The New York Gas Light Company proposed to light all the lamps south of Grand, Sullivan, and Canal streets at the rate of $12 per lamp; the Manhattan Company offered to light all lamps between the line of Grand, Sullivan, and Canal streets and Thirty-fourth street at $12 per lamp; the Mutual Company offered $8 per lamp for the last described district, and included the lamps around the Franklin Monument in Printing House Square; the Metropolitan Company bid $13 for between Thirty-fourth and Seventy-ninth streets, and the Harlem Company's proposal was $13.50 per lamp for those north of Seventy-ninth street. The awards will be made at the next meeting.

The amount charged for gas for the city in 1871 was over $1,000,000; the amount expended for gas for the city (excluding the Twenty-third and Twenty-fourth wards, which did not belong to the city in 1871) for 1875 was $620,466; the average price for lighting each street lamp in 1871 was $52; the price for lighting each lamp in 1876 is $23 to $37.95; the total number of street lamps lighted in 1875 was 17,775.

The Chicago Gas Difficulty.—The *Inter-Ocean* of the 2d inst. says with regard to this matter: "We agree very cordially with a morning contemporary, which thinks the idea of lighting a large portion of the city with oil a mistake. We go further; we think it absurd We do not think it is feasible; we do not think it would be profitable; we do not think the people will submit willingly to what, under the circumstances, would be a imposition. The residents of the West Side are and will be, taxed equally with citizens of other portions of the city to light the streets. To give the latter gas, therefore, while the former are put off with dingy coal lamps would be, not exactly provocation for rebellion, but an absurdity. We hope the contending parties will take Judge Drummond's advice and make some sort of a compromise by which neither the people nor the gas companies will be swindled, and which will leave the market for kerosene unaffected."

Boston, Mass., Gas Company.—This company has declared a semi-annual dividend of 2½ per cent., equal to $62,500. We note a recent auction sale of a few shares of this stock at $800 per share.

Cambridge, Mass., Gas Company.—We note a recent auction sale of six shares of this stock at $134.25 per share.

Montreal Gas Company.—About 300 shares of this stock have recently changed hands at from $159 to $160.50 per share.

Washington Gas Company, Philadelphia.—We note an auction sale of 385 shares of the scrip stock of this company, $5 paid, at $22 per share.

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The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and Vicinity	Cap. Stk.	Par.	last Divid.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2½	Oct. '76	101	105
" " Bonds	90,000	1,000	†3½	Aug. '76		109
NewYork, "	4,000,000		5	Nov. '76	135	136
Metropol. "	2,500,000	100	5	Sep. '76	145	—
" " Certf.	1,000,000	....	3½	" "	102½	104½
" " Bonds	500,000	1,000	3½	Dec. "		102½
Harlem "	1.850,000	50	4	Aug. '76	105	—
Manhattan "	4,000,000	50	10	July "	240	245
Brooklyn, B'klyn..	2,000,000	25	5	Nov. '76	179	181½
Nassau "	1,000,000	25	4	Jan. '76	80	—
" " Certf.	700,000	1,000	3½	Nov. '76	95	—
People's "	1,000,000	10	3½	Jan. '76	50	55
" " Certf.	300,000	1,000	3½	July '76	88	90
" " Bds	325,000	....	3½	Aug. "		95
Metropol. "	1,000,000	10	3½	Nov. '76	75	77½
Wmsburgh "	1,000,000	50	3	Oct. '76	130	—
" " Certf.	1,000,000	....	3½	July "	101	102½
Citizen's " ...	1,200,000	20	2½	Jan. '76	95	100
" " Certf.	320,000	1,000	3½	Oct. "	98	100
J. C. N.J.....	[illegible]	20	5	July, '75	160	—
Centl. Westch. N.Y	600,000	"	1	July, "	90	—
Suburb'n " "	360,000	50				90

† Gold.

COMPANIES OUT OF TOWN.

We are reported no change in the quotations of the out of town companies, which, in the absence of transactions, are nominal. Our issue of Nov. 4 contains the prices of these, as were generally prevailing on that date.

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OFFICE OF THE AMERICAN BANK NOTE COMPANY,
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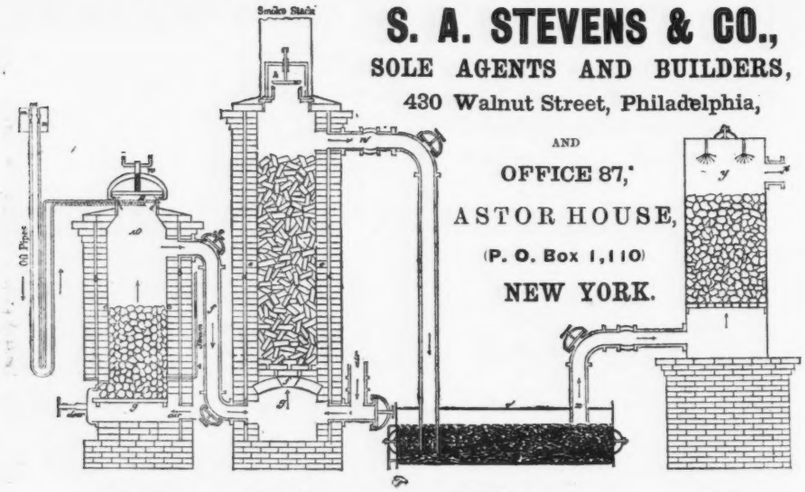

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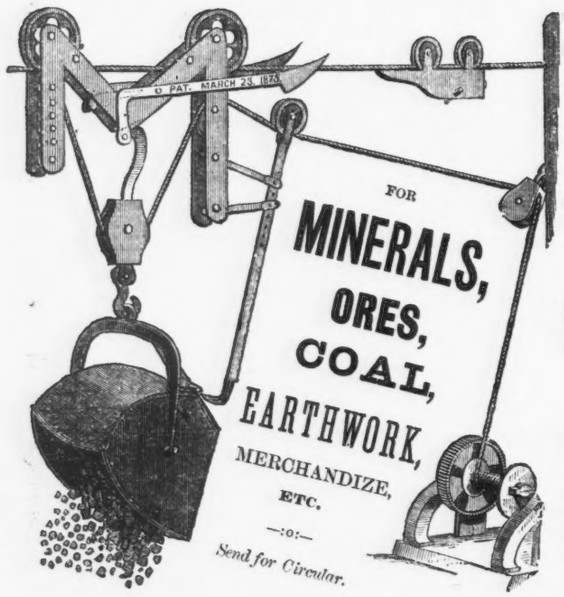

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